approach

OCTOBER 1969 THE NAVAL AVIATION SAFETY REVIEW

UNAUTHORIZED AIRSHOWS

that result in the loss of aircraft and aircrews for no better reason than that pilots chose to ignore or disobey flight regulations are "completely lacking in justification."

THE Naval Safety Center occasionally receives reports of aircraft accidents resulting from unauthorized flying exhibitions, usually at low level and in direct violation of military and/or civilian flying regulations. The audiences for these exhibitions vary from one or more crewmembers in the same flight to hundreds of unsuspecting people whose imagination some maverick naval aviator is trying to capture for reasons of his own. Whatever the size or composition of the audience, these exhibitions must be characterized as unauthorized airshows.

The participants in these senseless dramas seldom

Why?

The tragic result of a deliberate violation of flying rules.

mature into truly professional naval aviators because they run headon into the stern reality of drastic disciplinary measures or, worse, are claimed prematurely by death.

Recently a naval aviator crashed while attempting a low-altitude, high speed aileron roll in a T-1A aircraft. Witnesses state that the aircraft attempted a high speed aileron roll at very low altitude in close proximity to a popular beach. The maneuver was unsuccessful. Other evidence indicates that it was planned in advance.

Some unauthorized flying exhibitions are clearly the result of impulses which have been acted upon without thinking the matter through. But cases such as this where the action is premeditated are more difficult to understand. Another case where the action was clearly premeditated and equally flagrant involved the pilot of an A-4 type aircraft on a solo flight. He departed his home field on a VFR cross-country flight to a base about 300 miles away. The flight plan did not indicate any intermediate stops; however, enroute to his destination the pilot deviated from the flight plan and landed at a naval air facility used as an outlying training field. Prior to landing, the pilot contacted the naval air facility tower and told tower personnel that he desired a full stop landing for the purpose of leaving something with the crash crew and that he then would depart. He entered the break, executed a left aileron roll, entered the normal landing pattern and continued to a full stop

landing. After taxiing to the line the pilot contacted a civilian on the field whom he asked to take photographs of his aircraft while he was performing "dirty rolls in the traffic pattern." The civilian agreed to do this and was handed a camera. (This transaction was apparently the pilot's sole reason for making the full stop landing.)

The pilot restarted his aircraft and took off. Shortly after takeoff, he performed an aileron roll, turned downwind, performed two more aileron rolls and remained in the pattern for touch-and-go landings. After each touch-and-go landing the pilot made a left aileron roll at about 100 feet AGL and continued upwind for a short time before turning downwind. The sequence was repeated through four touch-and-go landings. On the fifth approach, the pilot performed a touch-and-go landing and was apparently in the process of a left aileron roll to a second touch down when the accident occurred. The aircraft contacted the runway in a right yaw, right drift, 15 degrees right wing down and normal nose up attitude. Initial impact with the runway was made on the right main landing gear, external wing fuel tank and starboard wing tip. The aircraft was engulfed in flames after 300 feet of travel. After another 300 feet the aircraft left the runway, the port wing broke off at the fuselage and the aircraft rolled inverted. The inverted aircraft slid another 1000 feet and came to rest 100 feet right of the runway. The pilot was fatally injured.

Accidents such as these are mercifully few and account for only a tiny fraction of naval aviation accidents *but even one* accident or injury resulting from a senseless, unauthorized exhibition of low level flying is intolerable.

It is impossible to consider the fate of these young men without experiencing mixed emotions: anger that they chose to violate their trust, frustration that it could not be prevented and sadness because they never reached the mature fulfillment of their potential.

The pilots in both these accidents were guilty of violating the trust and confidence placed in them by their superiors. Their violations were so gross as to appear irrational. In the case of the T-1A pilot, his maneuvering took place before some 300 to 500 witnesses composed mainly of naval aviation personnel and their dependents. It appears inconceivable that he expected to remain anonymous, even if he had succeeded in the maneuver attempted. This leads one to wonder whether he had the feeling or at least the hope that his actions would be condoned if he succeeded. More than likely, he simply failed to think through this aspect of his action and if he did think about it, it is probable that his judgment in this matter was no better than his assessment of his ability to complete the maneuver he undertook.

Likewise, the A-4 pilot could not have been under any illusion that his identity was unknown. And he wasn't. The investigation brought out the fact that the pilot had previously achieved considerable notoriety in the area for his unorthodox flying performances, yet his behavior had not been revealed to authoritarian levels.

Faulty Judgment Is Root of Problem

Aggressiveness is an extremely desirable trait in a naval aviator. Without it, he would be unable to function adequately in the demanding environment of naval aviation, either in training or in combat. Problems arise, however, when this aggressiveness is expressed in the performance of an illegal maneuver rather than being directed by proper supervision and self discipline into safe and useful training. At times the distinction between professional aggressiveness and foolhardy action is a fine one; nonetheless, an unauthorized low level flying exhibition, in violation of law and regulation, conclusively demonstrates poor judgment. How such faulty judgments are derived is not always clear but there are indications that some cases are the result of an immature choice in the selection of standards for measuring excellence. We may be able to gain some insight into the process through which such faulty judgments are derived by considering the report of an A-7B pilot who crashed and was fatally injured during a simulated strafing run.

The pilot was the leader of a two-plane flight scheduled to conduct air combat maneuvering and road reconnaissance. After takeoff the flight rendezvoused at 20,000 feet and proceeded toward a mountainous area. Upon reaching the mountains the flight leader descended to a lower altitude which was at times below the ridge lines. At one point, while below the ridge line in a wide valley, the flight leader did an aileron roll at an altitude estimated to be 1000 feet AGL. On two occasions, the wingman felt it necessary to caution the leader for being below the ridge line.

The flight proceeded northward toward a large lake at altitudes varying from 1000 to 3000 feet AGL. (This lake is the hub of a large number of resort facilities.) Just as they approached the lake, the leader started a descent which he continued to an extremely low altitude. At this point, the wingman was level at 600 feet AGL and called the leader and told him to watch his altimeter. The leader answered, "Roger, I'm 20 feet." A few seconds later, he commented on how beautiful the scenery was.

Upon crossing the far shore of the lake, the flight leader spotted some trucks which he decided to use as a simulated target. He called the wingman's attention to the trucks and commenced a right pull up with the wingman following. He pulled up to approximately 5000 feet AGL and called rolling in.

Continued

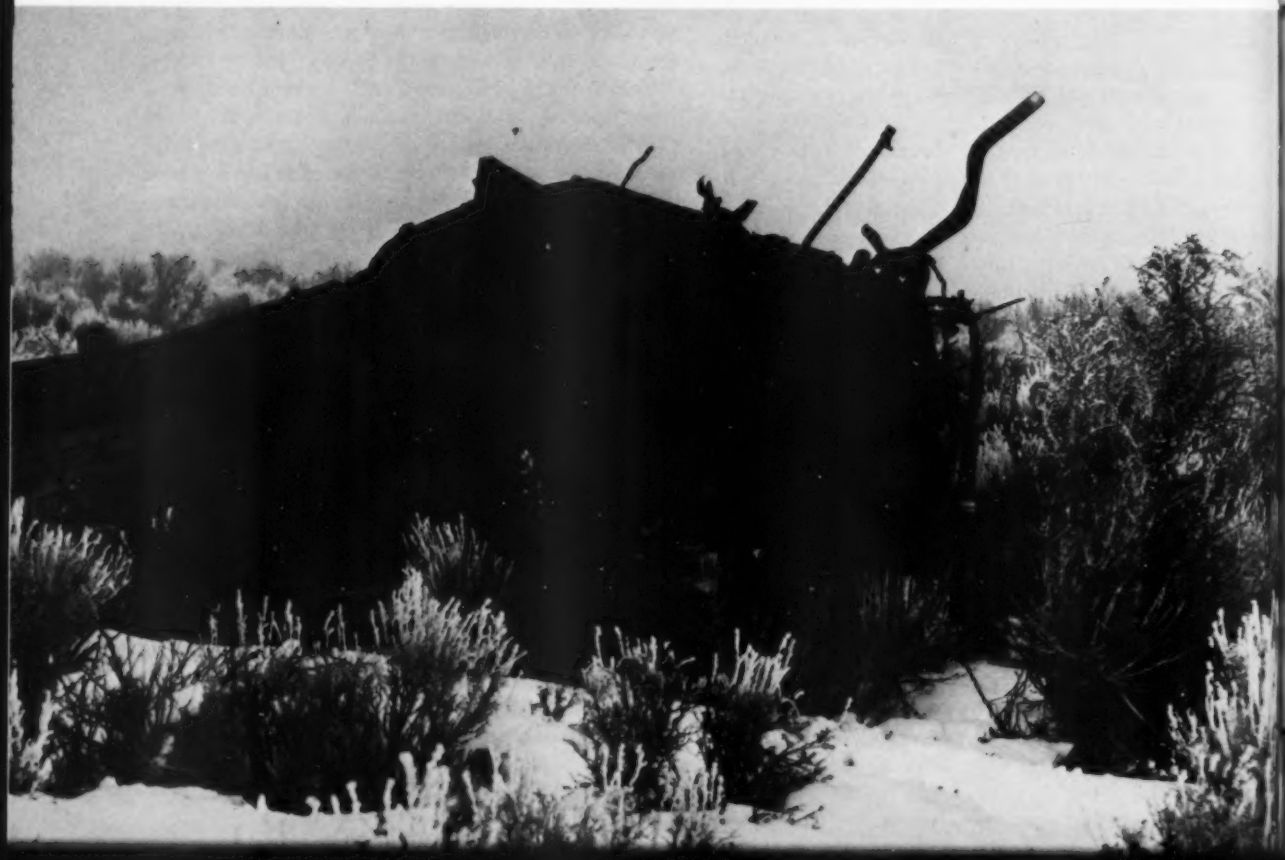
He entered a shallow dive of about 15 to 20 degrees to simulate a strafing run. During the run, he transmitted, "Rata-tat-tat, I got them." This was his last transmission. The wingman observed the leader to initiate recovery but then diverted his attention into his own cockpit. The wingman's attention was next drawn to a flash of fire on the ground. He did not actually observe the leader's aircraft impact but a witness on the ground observed the leader's aircraft continue its run to an extremely low altitude before losing sight of it. The aircraft struck the ground in a relatively level attitude with a low rate of descent and skidded along the ground for about 30 yards. The aircraft then impacted against a small dirt ridge and broke into many pieces. The pilot was fatally injured.

There was no indication of an aircraft malfunction or contributing bad weather conditions other than a cover of snow on the ground which may have had an adverse effect on the pilot's depth perception. The engine and flight controls were apparently operating correctly at the time of impact. To attempt to explain the reason why a qualified and capable aviator would make such an error in judgment, the pilot's professional ability, personality, experience and general attitude prior to the accident were examined by the board.

The pilot had successfully completed one combat cruise in A-4F aircraft and at the time of the accident had accumulated a total of 850 flight hours. During the course of his recent deployment and during the training period which had preceded it, he had exercised the A-4F through its complete flight envelope.

After returning from the deployment his squadron had transitioned to the A-7B and he had accumulated 78 hours in that aircraft. The flight on which the accident occurred was part of the squadron syllabus designed to enable the squadron to reach maximum readiness in A-7B aircraft prior to another deployment. The main intent of the flight was to introduce new pilots in the squadron to the tactical wing positions required in a combat environment. But . . . . the pilot originally scheduled as the wingman had reported sick in quarters and another pilot was assigned to take his place. This replacement was also a veteran of the previous A-4 combat deployment and had in fact flown with the flight leader many times in the past. Therefore, the purpose of the flight, i.e., combat wing position familiarization, lost much of its significance to these two combat experienced pilots. The wingman had already been briefed by the operations officer and the flight leader's brief was very short, indicating that the flight

Result of a late pull-out!



leader felt that he would not be required to provide any airborne instruction.

The initial portion of the flight was uneventful until they approached the mountains. The leader was then flying lower than necessary and appeared to be sightseeing rather than conducting road reconnaissance. It appears that very little emphasis was placed on the purpose of the flight. Rather, the leader seemed to be demonstrating to his wingman his aggressiveness and flying capabilities. But, except for the aileron roll below the ridge line the leader had not performed any inherently dangerous maneuvers although he *had* completely ignored the NATOPS requirement to maintain 500 feet AGL.

The successful aileron roll in close proximity to the ground probably enhanced his ego and confidence. He was probably complacent and exuberant as he discovered the trucks to use as a simulated target. As he displayed his aggressiveness by pulling up in a tight pattern, he probably was slower and steeper than he wanted to be but he pressed his run.

It was the opinion of the board that the pilot did not attempt an ejection although he had never in the past voiced any fear or prejudice against ejection if the situation warranted. The two most probable explanations for his failure to eject are, first that he failed to recognize his imminent danger, thinking that he would recover successfully; second, the reluctance of an aviator to eject quickly from a situation that he himself has caused.

A review of this pilot's training record revealed that he was rated generally as an average aviator during his pre-deployment A-4F RAG training. Specifically, he was below average in instruments, average in navigation and tactics, slightly below average in conventional weapons delivery and average in other weapons delivery. He displayed above average performance during the carrier qualification phase. His aggressive motivation during the training period and combat cruise in the A-4F aircraft helped develop him into a very capable aviator. A review of his performance rating during his transition to the A-7B aircraft indicated a well above average flight student. Out of 16 graded areas he was rated above average in 10. The remaining six grades were average. This significant improvement cannot be explained by any one factor but it certainly indicates a highly motivated young aviator making maximum use of his recent combat flying experience. Personal knowledge of the pilot during the combat cruise by two of the board members plus an evaluation by a close friend attest to the fact that he pushed himself to improve his flying ability.

The evaluation of the pilot by his closest friend

Was this flip necessary?

indicated he was a serious young man with a mature sense of responsibility. However, his sense of responsibility was tempered with a lighthearted and almost intoxicating enjoyment of aerobatic flight. This may have contributed to the events which resulted in the accident.

Comments included in the medical officer's report also indicate that other friends and associates were unanimous in describing him as an intensely motivated naval aviator, constantly striving to learn and to improve his capabilities. He was said to be dedicated, very self-confident and aggressive, anxious to prove himself in combat. He wanted to be known as the best aviator in the squadron. His greatest enjoyment was "putting the aircraft through its paces." Aileron rolls and inverted flight were his favorite maneuvers which he would freely indulge in upon "feet wet," returning from combat missions. He craved all forms of aerobatics and any form of flight which challenged his ability to handle the airplane.

The flight in point took place following an extended holiday season. The pilot's attitude upon returning to flying following the holiday season is evidenced by his actions which prompted several calls from his wingman warning him about safety of flight matters. It is felt that he was in an exuberant mood and to paraphrase the words of his closest friend, "He really released all his inhibitions by putting the plane through its paces – to the very limits of its capabilities." His exuberance apparently clouded his judgment, lulling him into unsafe and unauthorized practices.

He was evidently attempting to prove his flying ability to himself or to his wingman. He strove for excellence but manifested immature judgment in his choice of the method of measuring excellence. He did not make the distinction between true skill in a professional sense and foolhardy chance taking. He had greatly increased his performance since entering jet aviation by pushing himself. This time he went too far.

Also noteworthy is that only two weeks prior to the accident, he had requested and had been cleared for a low pass down runway 32 at home field. The pass had been flown at an undetermined high rate of speed but in any case above 250 knots. For this he was admonished by both the operations officer and the commanding officer.

The board concluded that the pilot's previous success, driving desire to excell, relatively limited flight experience and over-exuberant approach to the flight combined at a crucial moment causing an error in judgment which resulted in the accident.

Our Personal Obligation

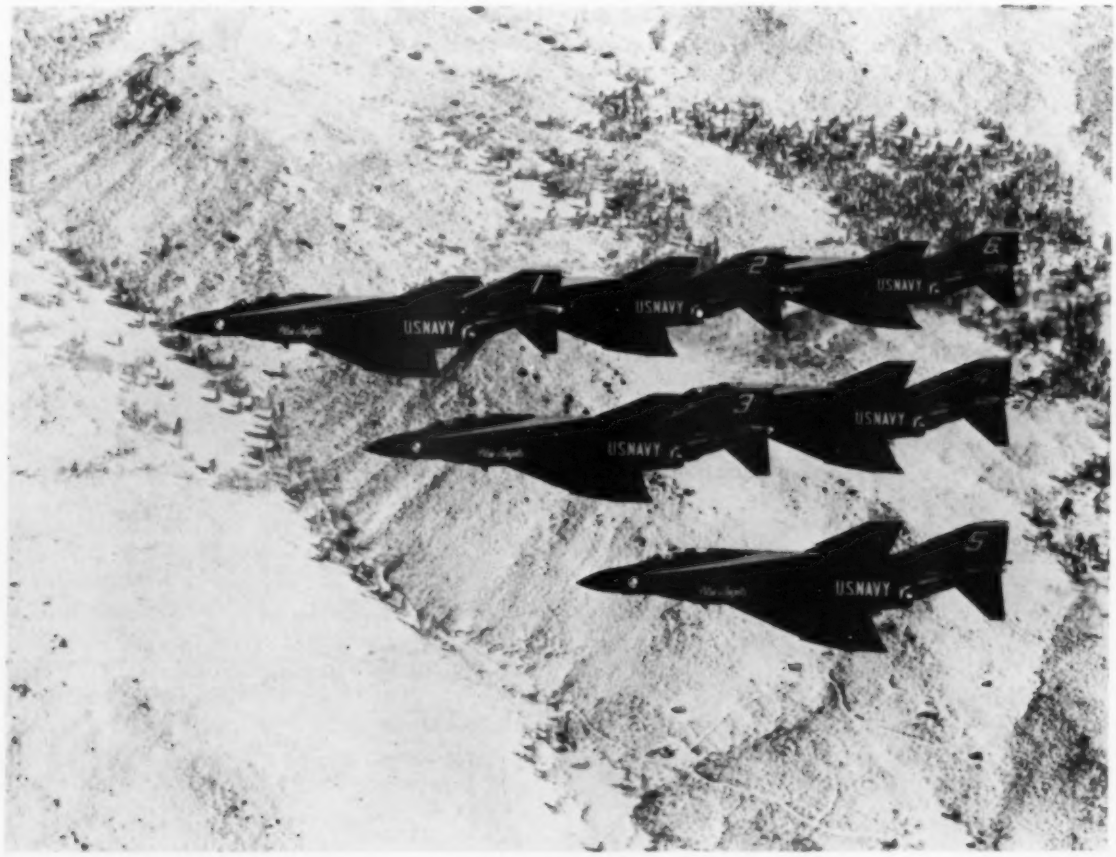
Accidents such as these are completely avoidable and are, therefore, completely lacking in justification. They can only be described as a useless, senseless waste of lives and aircraft. There have been similar accidents in the past and there are those who are willing to predict similar accidents in the future. It may come to pass but there is no need for it to be.

Whenever an accident occurs for no better reason than that the pilot chose to deliberately violate established rules and regulations, or even common sense, there is a tendency to create more regulations or to put more teeth in those already existing. This is understandable because accidents such as these cannot be tolerated. However, good judgment and common prudence cannot be instilled by mere legislation in those who have not yet developed these characteristics.

As members of the naval aviation community we must first ask ourselves if we conduct our own duties, flying or otherwise, in a mature and professional manner. If the answer is not totally affirmative it is entirely probable that our shortcomings may be unwittingly emulated by those who look to us for example. But we must go further; it is not enough that we personally conduct our own duties connected with flight operations in a safe, sane and professional manner – we have a moral obligation to refuse to lend support and approval (tacit or otherwise) to those few immature individuals who would abuse the trust and confidence placed in them.

In many ways in naval aviation we *are* our brother's keeper! Through leadership, example, professionalism and, whenever needed, "friendly guidance," let's keep each other straight. ◄

Let them do the Air Shows!



F-8 Spin Recovery Technique

NAVAIRSYSCOM msg 220641Z of May 1969 discusses F-8 spin recovery techniques, noting that the technique of raising the wing for spin recovery has been widely communicated among F-8 pilots. The message concludes that *raising the wing to recover from a spin is not a recommended technique.*

Wing-up spin recoveries and the relative merits of using this technique have been considered by NavSafeCen, the contractor and NavAirSysCom. It is concluded that in every known case where the wing-up technique was used the allowable speed and G limits were exceeded; hence, the NavAirSysCom recommendation is against this technique.

In a recent fatal crash of an F-8B, it is suspected that the pilot used this technique resulting in overstress and structural failure of the aircraft. In this case the pilot was acting as the chase pilot for a scheduled two-plane aerobatic flight. The flight proceeded as briefed for the first hour. The lead pilot then accelerated to 500 kias at 10,000 feet and commenced a loop. During this maneuver the chase pilot requested that the lead pilot increase the Gs during the pullup. The lead pilot complied by increasing his stick force to 5 Gs. As the lead aircraft came over the top at 270 kias, the chase pilot called in a tense, urgent manner, "Out of burner, out of burner!" The lead pilot then deselected afterburner and completed the loop. After returning to straight and level flight, he was unable to establish either radio or visual contact with the chase pilot. Subsequent investigation disclosed that the chase aircraft had crashed into the ocean. There was some evidence that the pilot had initiated the ejection sequence but not in time to prevent fatal injuries.

As a result of the investigation, it was concluded that the most probable cause of this accident was pilot preoccupation and disorientation during an aerobatic maneuver which resulted in a spin. Based on a study of the wreckage and the statement of the lead pilot, the investigators presented the following analysis as being the most probable sequence of events leading up the mishap.

Both aircraft approached the top of the loop maneuver in the inverted position. The chase pilot, flying in a trail position, deselected afterburner as briefed. Since the lead aircraft remained in afterburner, the chase pilot would immediately begin to lose airspeed and available G if he attempted to match the leader's flight path. With his attention on the lead aircraft, he may have entered a post-stall gyration in an inverted attitude. Still concerned with the leader's well-being, he rapidly transmitted, "Out of burner, out of burner!" before directing his attention back to the cockpit. Before he could analyze the situation and properly react, his aircraft entered a spin. (Altitude loss in a spin with a sweptwing aircraft is dramatic.) After passing 10,000 feet without regaining control he most likely raised the wing as a final means of recovery prior to ejecting. The wing-up method probably arrested the oscillation but presented him with a low altitude, high G pullout situation in a haze layer below 4000 feet. The raised wing could not withstand the G required to effect pullout and failed at its fuselage attachment points. The chase pilot then initiated ejection via the alternate handle, but too late.

To reiterate, all available information indicates that there is a strong likelihood that the aircraft structural limitations will be exceeded in the wing-up spin recovery. The wing-up technique is therefore prohibited by NATOPS.

FAA Report of NEAR MIDAIR COLLISION Study (1968)

Background

AS A RESULT of several FAA/industry/military meetings in late 1967, it was decided to establish a NMAC (near midair collision) reporting program in order to gather data and determine the factors which cause or contribute to midair collisions and near-misses. A key provision of the NMAC reporting program granted immunity to parties involved from any adverse action which might result from their voluntary reports (refer to OpNav Note 3750 of 6 Jan 1969).

All reports received during the study were turned over to a special FAA near midair collision study group for analysis. The objective was to identify basic causal factors and to develop appropriate corrective measures.

The FAA has recently issued a report which provides details on the NMAC reports received during 1968. We have excerpted portions of the FAA report which should be of general interest but more importantly can also be useful in efforts to eliminate Navy involvement in mid-airs or near mid-airs. – Ed.

Some Statistics

• Of the total number of NMACs reported, 1128 – about 50 percent – were classified as "hazardous." The remainder were classified as "non-hazardous," with the separation between aircraft exceeding 500 feet and sometimes up to several miles.

• The FAA estimates that during the reporting period there were approximately 52.3 million flight operations of all types conducted in the United States. At this rate, one near midair collision report was filed for every 25,000 operations. The rate of hazardous incidents was one for every 50,000 operations. On the other hand, the report *estimated* that four hazardous NMACs occurred for each one reported. Parenthetically, it is noted that there were 35 actual midair collisions between powered aircraft in 1968 in the United States resulting in 68 fatalities.

• Terminal areas predominated over enroute airspace in the frequency of reported incidents. The report lists 719 hazardous NMACs for terminal areas, as opposed to 409 in the enroute airspace. Of the 719 terminal incidents, 98 took place in the vicinity of non-tower airports. In the terminals with control towers, conflicts with unknown traffic presented the most serious problem area found in the report.

• As might be expected, NMACs were clustered around large metropolitan cities and along published airways. The study revealed that the 10 areas with the most incidents classed as hazardous were those surrounding Los Angeles, 97; New York, 74; San Francisco, 48; Washington, D.C., 33; Philadelphia, 31; San Diego, 37; Chicago, 26; Denver, 19; Kansas City, 18; and Phoenix, 18.

• In general, the number of near midair collisions occurring at any specific location is proportionate to the amount of air traffic activity. Analysis revealed that other local factors may be of significance, such as terrain, proximity of airports and military air bases, primary traffic flows and availability of air traffic control services.

Major Problem Areas

In defining the causes of the 1128 reported near midair collisions considered to be of a hazardous nature, the report listed 10 major problem areas:

• *See and Be Seen* – This area covered aircraft flying in VFR weather and depended on the pilot's ability to see and avoid other traffic. Twenty-one percent of the hazardous incidents occurred in this area. The major cause listed was that pilots frequently had difficulty sighting other traffic because of speed differences, aircraft silhouettes, relative position or other reasons.

• *Mix of IFR/VFR Aircraft* – This problem area, which concerns the uncontrolled mixture of VFR and IFR traffic, accounted for 20 percent of the incidents with three-fourths occurring in terminal airspace. The highest causal factor involved situations where one aircraft was climbing or descending and encountered another aircraft in level flight.

• *Airspace Navigation* – This was the third most serious problem area, figuring in 14 percent of the incidents. The major causal factor involved aircraft converging on or diverging from navigation aids.

• *Traffic Pattern* – This problem was a factor in 12 percent of the incidents and consisted primarily of one aircraft cutting another out of the traffic pattern.

• *Pilot Deviation Indicated* – In the enroute area the major causes were pilots cruising at the wrong altitudes or failing to maintain altitude accurately. In the terminal area, the primary causal factor was pilots operating within an airport traffic area without radio communications or ATC clearances. Pilot deviation figured in 12 percent of the hazardous incidents.

• *Training* – Training operations also proved a major problem area, figuring 8 percent of the hazardous incidents. The major cause involved preoccupation by pilots with training duties. Aerobatics and simulated IFR flying with hoods were also listed as causes.

The remaining four problem areas were high speed aircraft encountering low speed aircraft, operations in marginal VFR conditions, proximity of airports with one another resulting in conflicting traffic, and air traffic control system errors. These four problem areas accounted for 13 percent of the reported incidents.

Recommendations

The FAA report listed 20 recommendations designed to minimize the possibility of midair collisions or near midair collisions:

Continued

- Develop and implement a system-at selected large air transportation hubs which would segregate by regulations or procedures all traffic operating within certain airspace designated for the primary airport(s).
- Implement a radar separation service at all large air transportation hub locations for all participating aircraft operating within an established terminal radar service area (Stage III of the National Terminal Radar Program).
- Amend the FARs (Federal Aviation Regulations) to require all aircraft operating in a control zone which has an operating control tower to establish two-way radio communications with the tower when at or below 3500 feet AGL (above ground level).
- Publish in the AIM (Airman's Information Manual) a map depicting all large air transportation hubs to show the areas of concentrated IFR traffic for the information and guidance of pilots operating under VFR conditions. Establish a new VFR section in the AIM to include all references pertaining to VFR flight.
- Publish high density military areas, both training and operational, in appropriate airman information publications.
- Review the present regulations, policies and procedures concerning the establishment of airport traffic patterns at airports without control towers to ensure that traffic patterns are established.
- Require management responsible for non-tower airports to establish traffic patterns and to publish, distribute and prominently post diagrams of these traffic patterns.
- Develop and implement the concept of area navigation for both enroute and terminal air traffic.
- Institute a vigorous pilot educational program to stress the requirement that the present most effective means to avoid a near midair collision is constant vigilance on the part of all pilots at all times under all circumstances; that all pilots develop a working knowledge of their operational airspace; and that proper traffic pattern entry and departure, and aircraft spacing techniques be used.
- Review flight training syllabi and airmen examinations to assure that airmen are taught and are knowledgeable in those areas which pertain to operations within today's airspace environment.
- Instill a higher degree of motivation in flight crew members for improving crew coordination in order to increase vigilance outside the cockpit during all phases of flight.
- Encourage all airspace users, when operating at or above 10,000 feet, to fly on IFR flight plans, especially military jet fighter type aircraft.
- Amend the FARs to require 1000 foot vertical altitude separation immediately below the base of positive control airspace for aircraft operating VFR.
- Review military low-level, high speed VFR training routes for their locations and necessity, and insure maximum publicity of their locations and hours of operation.
- Review the necessity for operating high performance military jet aircraft below 10,000 feet in excess of 250 knots indicated airspeed.
- Review the "Hemispheric Rules" for possible elimination of any reference to feet above the surface as

a base altitude and for lowering the cruising altitudes related to MSL (mean sea level) below the presently applicable 3500 feet MSL.

- Review airport planning requirements to insure that future airport site locations are well clear of existing instrument approach courses.
- Recognize the need for improved cockpit visibility in the development of all future aircraft.
- Direct an extensive effort toward the development of an airborne collision avoidance system with cockpit displays as a prime solution to the near midair collision problem.
- Where the above recommendations are applicable, appropriate military authorities should consider their implementation.

Outlook

The FAA has already moved to implement many of the recommendations in the report and has taken other steps as well to reduce the problem of near midair collisions. Recently, for example, the agency issued notice of a proposed rule to establish area navigation routes which, among other things, would reduce the number of aircraft converging on navigation aids where a high percentage (40 percent) of enroute near midairs occur.

In addition, FAA has stepped up its pilot education efforts. The agency has put a general aviation accident prevention specialist in each of 31 FAA GADOs (General Aviation District Offices) in the Central and Southwest Regions as a trial program.

The agency is also participating with industry in the development of a sophisticated CAS (collision avoidance system) for commercial aircraft as well as a low cost PWI (proximity warning instrument) for general aviation aircraft. FAA currently is participating with the Air Transport Association of America in a flight test evaluation of various CAS equipment.

FAA also is pushing ahead with the automation of the enroute portion of its air traffic control system. The automated system, which includes direct radar display of aircraft identity and altitude information will first become operational at the Agency's Jacksonville (Fla.) Air Route Traffic Control Center where it is now under test and checkout, and all 20 centers serving the continental United States will have the system by the end of 1973. By that same date, the agency also expects to have similar automated systems installed at the 60 busiest airport control towers in the United States. The contract for the purchase and installation of this equipment was awarded last February.

In the *meantime*, the most effective means to avoid a midair collision is constant vigilance on the part of all pilots at all times under all circumstances. ◄

GOOD SHOW, CDR W. C. Miller, VS-31!

THE S-2E aircraft commander, CDR William C. Miller, was occupying the copilot's seat during night refresher carrier qualifications in order to provide a landing opportunity for another pilot. After the second night arrested landing the aircraft was taxied to the starboard catapult for launch.

As the aircraft left the bow the port engine failed and, simultaneously, the instrument lights went out. CDR Miller immediately assumed command of the aircraft and coordinated efforts with the other pilot to remain airborne. CDR Miller successfully flew the aircraft out of an extremely precarious situation and proceeded to a safe landing at a shore station although he was unable to feather the failed engine or to retract the nosewheel.

Commander Carrier Anti-Submarine Air Group 52 has formally commended CDR Miller for the superb airmanship demonstrated by the manner in which he turned a potential disaster into an uneventful incident.

Well done!

Short Snorts

What you don't know won't do you any good either.
Anon.

Just a Drag

THE pilot of a TS-2A was taxiing from the squadron line to the run-up area when the starboard brake appeared to lock. He stopped, asked for assistance and waited until help arrived. Investigation revealed that maintenance personnel failed to install the inner wheel bearing after a wheel/tire change earlier that day. The starboard wheel and brake assembly were scored and partially melted due to friction. The C.O. said, "Errors of this type cannot be accepted. Maintenance supervisors are being reminded of their direct responsibility to ensure timely and completed work from their subordinates." There have been so many instances in the *Stoof* where wheel bearings have been omitted when changing the wheel/tire assembly that it should be automatic now to check the bearings and the bearing cups for correct installation.

Pilot or Driver?

ONE of the best statements of differences between airplane drivers and airplane pilots was made by the Chief Pilot of the Los Angeles Flying Tiger Line. We offer it here . . . because he states it so well:

"There are lots of airplane drivers but pilots, in the best sense of the word, are not so plentiful. The drivers get an airplane from here to there but give little thought to finesse. If something goes wrong,

they may end up as a statistic. This is not because they are unintelligent but because their flight judgment is terrible.

"The professional pilot, on the other hand, is ahead of the flight, the crew and the aircraft at all times. He has preplanned the flight for all contingencies and stays abreast of developments. He flies smoothly, precisely and courteously. When the flight is completed safely, it is not a matter of luck; it is because he planned it that way." – *FSF*

Little Things

"This is a classic example of an accumulation of minor errors . . .

The maintenance control man *forgot* to stamp the yellow sheet 'test flight required.'

Another maintenance control man *assumed* that the aircraft had cleared test because the yellow sheet was not stamped.

The pilot was *in a hurry* and did not preflight the aircraft properly.

The plane captain knew that something was wrong with the seat but was *not sure* what the extent of the problem was.

The pilot *failed* to investigate the problem when advised by the plane captain."

THE above quote represents some of the remarks of a C.O. taken from an incident endorsement. A pilot with a total time of about 1900 hours discovered, while in the break, he could not pull back on the stick. The rear seat straps were loose which permitted the chute pack to slide forward and lodge between the seat and the stick. Even though at an 80 degree angle of bank the pilot was able to recover by raising the speed brakes and by using top rudder and nose-up trim. He made a safe landing! This was the first exhibit of professionalism that day on the part of many personnel.

Naval aviation is a profession which does not tolerate marginal or

substandard performance. Things, attitudes and actions highlighted by italics in the quote have no place in naval aviation. One learns from the faults and mistakes of others and there is a message here for everyone in the aviation community.

'Round & 'Round She Goes

DURING a night helo practice approach to the water the copilot had good control until he got close to the surface. When the pilot saw the altimeter pass through 30 feet descending he took the controls and pulled up hard on the collective. The chopper, slowly gaining altitude, was spinning rapidly to the right despite full left rudder. After three complete turns the pilot eased off the collective in order to get rudder control back even though he had only climbed to 200 feet. Excessive collective and slow speed combined to create too much torque for the tail rotor to be effective. The C.O. said that inexperience and minimum training were responsible for this hairy event.

Safety Tip

MANY WORDS have been written on the subject of "use of the checkoff-list." Yet after many words and continuous reminders for all pilots at nearly all preflight briefings, accidents and incidents continue to happen because the pilot made a "visual sweep of the cockpit." In some cases this less than professional attitude toward a "checkoff-list" occurred during conditions where the dual concern for an armed enemy and a carrier landing is not involved. These acts of visual sweep of the checkoff-list are perhaps related to an unconscious tendency for some to view shore based operations in a relaxed manner with less attention to detail. Certainly one cannot rest his aviation future on past laurels. Professionalism in the operation of aircraft requires constant attention to detail and preparation for any eventuality. – *ComNavAirPac Weekly Accident Advisory*

The Sound of Failure

A PILOT'S vivid recollection of the engine sounds during the failure evolution caused his prompt and correct action before a firm engine failure indication was produced.

In this instance the SH-3A was two hours into a flight and while the pilot and copilot were involved with the pre-dip checklist at 150 feet and 65 knots, a sudden vibration of the chopper was accompanied by an unusual sound. The pilot called for full power while he initiated a turn towards home base. A scan of the instruments confirmed No. 2 engine failure. The engine was secured and a single-engine landing was made without further incident.

A tape recording of compressor stalls in an engine test cell is being produced locally. If the tape proves of significant value it will be utilized to familiarize all H-3 pilots with that unique sound.

MECH Available By Subscription

Beginning with the Summer '69 issue, MECH, the magazine for naval aircraft maintenance and support technicians will be available to the public through private subscription. Industry, publishers not on the Exchange List, Reservists and others having a need for personal copies may order the magazine from the Division of Public Documents, Government Printing Office, Washington, D.C. 20402.

Subscription rates: Single copy, 75 cents; 1-year (4 issues) $3.00.

This technique has been used for years by industry to detect bearing failure in heavy machinery. The extension of this technique to the training of aircrews may be worthwhile as in the case just cited.

Don't Rush It, Man

THE PILOT of an SH-3D was making touch-and-go landings (ASE off) at his home field. While climbing out at 70 knots, and at about 150 feet, the tail rotor gear box chip detector light illuminated. He started a descent immediately and made a precautionary, no-hover landing at the end of the runway. During the descent the copilot added full power (unknown by the pilot). At about 30 to 40 feet altitude, as the pilot came in with collective, he felt "unusual vibrations." As he landed he dumped the collective (cyclic was slightly aft) and the rather abrupt handling of controls caused one main blade to flex downward and strike the tail rotor drive shaft.

The pilot did not analyze the situation correctly and in his haste he set up all the conditions necessary to cause the incident. The irony of this event was that an investigation failed to reveal any reason for illumination of the chip light.

The C.O. commented that the pilot's decision to land the helicopter as soon as possible may have been influenced by a previous squadron incident wherein an intermediate gear box failed following illumination of the chip detector light.

The pilot's reaction and handling of the assumed malfunction, up to the point of landing, was normal. However, he failed at the critical time to stay ahead of the plane and by not coming to a hover he had the controls in the wrong position when the plane touched down. ◄

ROTOR WASH HAZARDS

NO ONE WILL dispute that helicopters are versatile aircraft. As angels of mercy they have rescued hundreds of downed pilots and crewmen and thousands of victims in flood areas and other disaster areas. They have sped the sick and injured to hospitals from ships many miles at sea. They have quickly transported men and materials to otherwise remote or inaccessible areas. Military missions involving support, assault, SAR and ASW are carried on routinely by helicopters in Southeast Asia. However, along with the ability to accomplish these versatile missions, helicopters, like all aircraft, exhibit certain dangerous and potentially destructive characteristics. These characteristics are the rotor vortex cores and the hurricane-force winds caused by their whirling rotor blades, which under the right circumstances can create havoc.

Review

The results of a survey of the number and kinds of accidents occurring during the past four years that can be attributed to rotor wash are shown in the accompanying figures. Fig. 1 merely shows the number of accidents per year by model and Fig. 2 gives a short description of each accident. Since the H-1, H-2 and H-3s are the models least exposed to the environment and conditions causing rotor wash damage it is not surprising to find them only occasionally involved. Notice in Fig. 2 that in one-fourth of the accidents the chopper did not incur any damage (category F) and that in slightly more than half of the accidents there was limited damage (category E). Of great concern is the avoidable accident caused by passing overhead or too close to other helicopters, automobiles or other aircraft. *Non-professional techniques!* Any helicopter pilot who flies directly over another aircraft at less than 200 feet or air taxies within 200 feet of another aircraft or vehicle is in the danger zone. The rotor vortex cores and rotor wash velocities are extremely dangerous. Five accidents involving major damage were incurred by helicopters which were airborne and were forced down by the rotor wash of other helicopters.

General Precautions

Some rule of thumb operating guidelines are as follows:

- When operating in congested line areas after landing or before takeoff, elect to be towed or ground taxi instead of air taxiing.
- When air taxiing never pass over or close to another aircraft or vehicle. Air taxi downwind of parked aircraft rather than upwind.
- When airborne do not fly over parked aircraft or vehicles if below 200 feet and never fly over or near another hovering helicopter.
- When making section approaches and landings double the distance (400 feet) from the section to any aircraft or vehicles on the deck.
- When possible avoid any takeoffs and landings for a period of one to two minutes through the same airspace – below and behind another airborne helicopter. ◄

Rotor Wash Accidents

Model	Fiscal Years			
	66	67	68	69
H-1	–	1	1	2
H-2	–	–	–	–
H-3	–	–	1	–
H-34	2	7	4	3
H-46	2	8	5	3
H-53	–	2	3	4
Totals	4	18	14	12

FIG. 1

Damage and Brief Description

Model	FY66	FY67	FY68	FY69
H-1		B. Air taxi forced down by rotor wash of other helo	E. Air taxi forced down by rotor wash of other helo	E. Blade damage by other helo rotor wash E. Sucked up wind sock
H-3			F. Blew battens off parked aircraft elevators; damaged elevators.	
H-34	D. Damaged by leaders rotor wash landing C. Chute blew into blades	D. Canvas target blew through tail rotor E. Crate lid blew into rotors E. Debris in LZ E. Unhooking ext. load; blasted parked aircraft F. Damaged elevators and tail of parked aircraft C. Sucked up plastic cover in LZ E. Sucked up debris in LZ	E. Rotor wash blew man into blades E. Sucked up sheet metal E. Blade damage by landing helo C. Other helo rotor wash blew subject aircraft into obstruction in fuel pit	E. Sucked up chute F. Blew over light plane during air taxi E. Sucked up panel in LZ
H-46	F. Rotor wash damaged C-47 A. Rotor wash of section leader caused strike damage while in a hover	F. Rotor wash damaged private vehicle E. Sheet of metal sucked into blades E. While unhooking external load, rotor wash damaged parked aircraft E. Rotor wash debris set off mine E. No. 3 in section blew tarp into No. 2 E. Hover in LZ blades sucked up debris F. Rotor wash damaged civilian aircraft F. Rotor wash damaged C-47	E. Rotor wash blew two unchocked aircraft together E. Sucked up debris E. Sucked up debris E. Sucked up debris C. Chute blown into blades by other helo	F. Flight of three blew over three civilian aircraft E. Sucked up debris E. Sucked up debris
C-53		F. Rotor wash damaged other aircraft during air taxi F. Rotor wash blew workstand into other aircraft	F. Rotor wash damaged other aircraft on taxiway F. Rotor wash blew parked aircraft over E. Sucked up tarp	E. Sucked up troop's gear F. Rotor wash damaged other helo E. Settled on external load by rotor wash overhead E. Other helo rotor wash caused blades to hit can.

Damage Code
A – Strike
B/C – Substantial
D – Minor
E – Limited
F – None

FIG. 2

The following narrative was recorded by the pilot of a Canadian Force's S-2 *Tracker* launched from a carrier during at sea operations. Midway through the catapult stroke the swage fitting on the bridle cable failed. The aircraft had insufficient airspeed for flight and the pilot recounts the events that followed.

The Short Stroke

"WE BRIEFED at a quarter to five on Sunday the 16th of February for an anti-submarine tracking exercise. The briefing was normal. The signal to man aircraft was given a half hour before launch time. The crews left the briefing room and went up on the flight deck. My copilot and one of the operators did the preflight on the aircraft while I climbed in, gave an internal inspection and strapped myself into my seat. Startup was at twenty minutes to six. Startup was normal, runup checks were normal. The aircraft was serviceable. My aircraft was arranged No. 2 on the deck. After the first aircraft was catapulted we were taxied forward into the mooring chocks, passed forward to the flight deck officer and wound up. I checked into the aircraft, the aircraft was serviceable. I gave my copilot the signal that we were serviceable and he saluted the flight deck officer. The flight deck officer dropped the green flag which is the signal to fire the catapult and the catapult fired. The catapult shot appeared to be normal until approximately half way down the catapult track when all acceleration disappeared. I had a shot last year where I thought that the catapult hesitated in the center of the shot, so I had a flash thought that this was happening to me again, but I pretty soon realized that something had gone and I, of course, then thought I had a cold cat which everyone is afraid of, I think. We were approximately half way down the catapult track – 50 to 60 feet of flight deck remaining with far too much speed to stop and not nearly enough to fly, so I didn't have any choice, the only thing I could do was to try and land the aircraft in the water as nearly at flat attitude as I could get to enable the rest of the

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crew to escape. The aircraft impacted, I think, about 50 to 60 feet ahead of the ship in a reasonably flat attitude. I feel that I had some elevator control in the descent from the flight deck to the water and that the nose was coming up on the aircraft at impact. The gear was down when, or as, my aircraft hit the water so there was a column of water that came up from the space between the pilots legs and went right up through the hatch. The aircraft started to fill up quite quickly so I let go of the controls – undid my harness – and started to go up through the overhead hatch which was already opened. As I was standing in the seat, ready to leave the aircraft, the ship, which I had forgotten all about, ran into the airplane. The hatch clipped me across the back and then the ship trod the aircraft under the water taking me with it. I came out of the aircraft and I pulled the right hand side of my mae west which I don't think inflated, but I don't know. Then I began bumping down the underside of the ship. There was a lot of turbulence and I was being turned over and pushed around. I almost drowned. I had reached the point where my chest was working and just circulating the salt water. I reached the stage where I knew that I was going to drown. Then I saw the white water which was the cavitation of the screws and I realized a fraction of a second before it happened that I was about to go through the ship's propellers. I saw the propeller blade which hit me come from about the 12 o'clock position down to the 9 o'clock position and I guess this was an indication that the ship must have had the props almost stopped, as I could see the individual prop blades. The blades passed in front of my face and struck me in the leg. I think that the shock of my leg being amputated woke me up enough to make me continue with some survival effort, because it was after this that I pulled the other side of my mae west. I felt definite inflation of the mae west and then I floated to the surface in the wake of the ship. When I surfaced I was looking straight towards the rescue helicopter. He was less than 400 yards away from me and he was coming straight towards me with his horsecollar skipping across the waves. I am sure that the helicopter crewman, in order to put me in the sling, must have jumped 30 or 40 feet into the water because I remember I was in the water with a large pink bloodstream spreading around me and I know that I wasn't in any condition to put myself into the collar. I feel that if the helicopter captain hadn't made the decision to pick me up right away, and if this crew hadn't worked so fast and so efficiently getting me out of the water, it might have made the difference between survival and death. So the helicopter crew picked me up – put me back on board the carrier. I was taken down to the sick bay and they started pumping blood into me and stopping the bleeding in my leg and giving me morphine to stop the pain and started generally, to build up my strength and decrease the shock effects so that when I got ashore they could operate on me.

"The accident occurred about 3 minutes before 1800 and I think I was back on the ship by about 5 minutes after. I stayed on the ship until approximately 2100 when I was lowered into a *Sea King* helicopter and flown to Rodrigues Army Hospital in San Juan.

"The other three crewmembers got out, I think, before the ship struck the aircraft. One crewmember managed to swim completely clear of the ship and never entered the turbulence from the ship passing through the water. The other two crewmembers I'm not sure about, but I think they just bobbed down the side of the ship and into the wake.

"The helicopter crew saw the first head appear in the wake and went over and picked him up immediately. While they were doing this the other three crewmembers came to the surface in the ships wake and the helicopter captain was faced with the decision of which one to pick up first. He took a quick look and, of the three, he decided that I was the one in the worst shape. As it turned out the other three crewmembers didn't have any injuries at all, so his decision was an extremely good one."

(The important thing to remember in a difficult survival situation such as this is not to give up. The pilot, although feeling he was going to drown, was still aware of what was happening to him and as long as the mind is working there is a chance for survival. Had both mae west toggles been pulled it is possible that the pilot would have surfaced somewhere along side the ship perhaps minimizing his injuries. In any case, follow your survival training to the letter and the odds for survival will be in your favor. – Ed.) ◄

". . . then I pulled the other side of my mae west. I felt definite inflation of the mae west and then I floated to the surface in the wake of the ship."

Is YOUR personal equipment ready for an emergency?

Individual and Flight Safety Mishap Reporting

I WOULD like to see an article published in APPROACH which justifies sending an AAR through the chain of command. The object of statements, especially the pilot's, is to honestly reveal what actually happened. How can anyone, especially pilots, be expected to admit stupid mistakes if their statements will be read by everyone in the chain of command? Is there a skipper anywhere who can completely disregard what was presented with the view of preventing accidents if it reflects adversely on the competence of one of his pilots?

Why not send the AAR directly to NavSafeCen? NavSafeCen could decide how much of the report should be sent through the chain of command for endorsement. If NavSafeCen really wants honest statements it will have to devise a better way than now is in effect to provide immunity to those making the statements.

Anymouse ASO

Anymouse raises some pertinent questions. We don't pretend to have all the answers but we believe an excellent article by CDR R. J. Copin, Chief, Flight Safety Section, USCG, which appeared in the USCG Flight Safety Bulletin No. 32 dated May 1969 contains some excellent observations. What follows is a version of that article which has been adapted for Navy readers.

What's With the Flight Safety Program These Days?

or
Why Don't They Get Off The Pilot's Back?

OpNavInst 3750.6F describes the basis and some of the concepts of the flight safety program but a lot goes unsaid. Let's face it, flight safety as a program is still, to many, merely a thorn in the side. A commanding officer might be thinking, "I can run this cotton pickin' outfit without a young whippersnapper giving with suggestions all the time; why doesn't he just clam up and give it a rest for a change; I've forgotten more about flying than he'll ever know" . . . . . or . . . . . a maintenance officer might say to himself, "I'm the only officer at this unit trained in maintenance procedures and the proper methods of coordinating the inspection and repair of aircraft systems and, besides, maintenance is my responsibility, so why don't you go away little man" . . . . . or . . . . . any aviator might be heard saying, "Hold it fellas, here comes the ASO! Don't put that eleven and a half hour flight up on the board 'til he goes by or he'll pull out the d----- crew utilization tables on us

and we'll have to call in Dave Gooblatz from leave to be the third pilot . . . . ."

Hey, wait a minute, you may be thinking, especially you senior types who may not feel this way at all. Perhaps as commanding officer, you have more than once publicly announced your total support for flight safety and have instructed your department heads to cooperate to the fullest with your ASO and you sure don't shortcut the crew utilization standards at your unit, no siree . . . . . or as maintenance officer, maybe your reaction is something like, "You've got it all wrong; the ASO and I are real buddies. I have a lot of respect for his ideas and don't at all mind him thumbing through the yellow sheets or being seen in my shops. In fact, I like the idea of having an additional check on our system and have told all my supervisors to treat the ASO like one of the family; after all, we're human and do make mistakes and the better our maintenance, the better off everyone will be . . . "

There is no question in my mind that it would be naive to think that the flight safety program at long last has been accepted by all, seniors and juniors alike.

Well, I have no way of knowing exactly where the real world lies, but I suspect the state of the art is somewhere between the former extreme view of flight safety as an absolute nuisance and the latter claim that flight safety is an integrated and comfortable part of the everyday routine business of flying. There is no question in my mind that it would be naive to think that the flight safety program at long last has been accepted by all, seniors and juniors alike, with ASO's no longer looked upon as spies in any quarter and no longer suspected of collusion with their seniors. However, I do think that we have reached the point where safety programs are reasonably well accepted by most individuals and this is encouraging.

Several factors militate against total acceptance of the flight safety system by one and all. An almost natural distrust stems from the *seeming* conflict between several features of the system such as:

- The system purports to promise absolute fairness and immunity from punishment but as far as a heckuva lot of pilots are concerned, the actions and decisions of too many pilots are too often criticized in print, either in flight safety publications or in the form of final reports;
- The big theme of flight safety is supposed to be mission effectiveness but in the opinion of some, "safety" either shoots down a mission or publicly denounces the justification for a particular mission *after* a mishap occurs;
- The program preaches that a free exchange of information is vital and implores everyone to lay all the cards on the table but it seems to be a one way street since not nearly all of the facts and opinions relating to accidents and incidents get printed – "censorship by selectivity, that's all it is;" and,
- The ASO just wants to be one of the "guys," but is unwilling to give up his direct line to the commanding officer.

If this is beginning to sound a little paranoidal, so be it. But I am anxious to make it clear that the flight safety program is not without imperfections. I also want to destroy any credibility gap if one exists. Something tells me that the system might work a little better and we might gain the confidence of some skeptics if we placed more of "our cards" on the table and admitted from the outset that the flight safety program does not have all the answers (just most of them).

One of the dilemmas of any flight safety program is that no one has been able to come up with a credible method for measuring the program's effectiveness. If we are doing well, who's to say we wouldn't have done as well or better without a flight safety program or with a program conceived and designed along markedly different lines. I may feel the record clearly shows our value and I may know in my heart that we've made a contribution but I'll always have trouble proving it because of the nature of the game.

Let's consider the aircraft mishap analysis system for a moment. There are those who don't give a hoot for this part of the flight safety program. It may not be a perfect system (what system is?) and we may not always come up with the correct answers but I am convinced that our method is basically sound. Sure, a lot of paperwork is required but if accurate and complete documentation helps to "paint a picture" or generate a change that someday results in the prevention of an accident, then surely the investment of a great deal of paper, ink and effort in the compilation of an accident report is worthwhile.

Why won't a legal board of investigation suffice? Well, I'd like to think that the number of people who believe in this approach are becoming fewer in number. I will say this in addition – it is my impression that as time passes, more and more people are beginning to recognize the merits of a separate "privileged" or "immunity"

reporting system.

How objective can the analysis of a board be when it comes to pointing a finger at the C.O., type commander or fleet commander? This can be a toughee but in my opinion it is not acute enough to shoot down the whole system. For one thing, if the board fulfills its responsibility for compiling a precise and thorough factual report of the circumstances, the facts will do the finger pointing for the board.

Why not arrange for "outside" investigation of our accidents so that the investigators wouldn't have to worry about a reporting senior in the organization? Couldn't one of the other governmental agencies having expertise in aircraft accident investigation do our investigations and analyses for us? This approach is *wholly impractical* for several reasons. No agency I know of is *equipped* to respond to all our accidents but, more importantly, such a solution would conflict with the concept of command responsibility for accident investigation which is a necessary part of our military system. Besides, most of our mishaps are caused by human factors and a completely accurate and thorough understanding of the unit's role and mission is required for an individual to perceive subtle human errors and make *realistic* and *practical* recommendations to cope with them.

No proud aviator who has 'been there himself' wishes to see a comrade criticized after the fact for doing what he considers reasonable and proper – even if his name is not used.

Do we have the expertise to conduct a good investigation and analysis? I believe we are as well equipped as anyone to ferret out accident causes – not always completely by ourselves but with competent outside *technical* assistance when necessary. Today we are investing more in aircraft accident analysis training than ever.

Why not get off the pilot's back in flight safety publications? Everything seems to come around to this point of Monday morning quarterbacking sooner or later. No proud aviator who has "been there himself" wishes to see a comrade criticized after the fact for doing what he or a great many pilots consider reasonable and proper – even if the individual's name isn't used. Furthermore, I have often heard that our publications are always telling about the bad and never the good things that pilots and aircrewmen do. Well, there is no law that says it has to be bad to be printed. On the contrary, we do try to come up with good things to offset to some degree the atmosphere of mistake, mistake, mistake that can permeate a flight safety periodical. This tendency to stress the bad is pretty natural since we're firmly in the business of providing advice on how to prevent accidents by avoiding the mistakes of others. Besides, the accident or incident report that does not contain or raise questions about someone's performance or decision or action is rare, indeed. Why? Because again, much of our damage results from human failings and, therefore, most of our reports carry descriptions of somebody's error.

Now to get back to the criticism of a pilot's action or decision, most of you would not believe that far more often than not, *your best friend is the flight safety program.* For when others are ready, on the basis of no real facts, to write off an accident as a result of an inexcusable pilot error, when some are quick to demand condemnation of the pilot after a cursory glance at the circumstances surrounding an accident, you can bet flight safety types – most of the time – are just as quick to assume the role of "public defender" for the pilot, primarily because he has been trained to gather as many facts as possible before drawing conclusions and because our limited human factors training has taught us that to err is human but *to find the root of the mistake is the name of the accident prevention game.*

To sum up our reply to Anymouse, constructive action cannot be taken without the facts. In many cases the facts can only be developed by the unstinting cooperation and assistance of the personnel intimately involved in the mishap. To this end our flight safety program incorporates provisions to accord such personnel immunity. The system of immunity is not perfect but everyone connected with naval aviation should strive to improve the system by removing any impediment to its constructive goal of improving flight safety. We must recognize that this goal is first, foremost and always to promote flight safety and never to effect punitive action against individuals.

We must recognize that as humans we are subject to error. But as members of the naval aviation community we must have the moral courage to do what is necessary to prevent mishaps from occurring even if it requires us as individuals to tell about our honest mistakes. Humans do err; we are not machines. ◄

Any safety program, like a chain, is only as strong as its weakest link.

the hard way...

22

WHILE walking across a hangar deck on this naval air station, I observed a first class petty officer and a striker attempting to jack up a C-131 aircraft. The aircraft was not roped off nor were there any warning tags displayed to prevent anyone from walking under the aircraft. This is the procedure the men were following: The striker would pump a few strokes with the jack handle; the first class would then use a heavy (about 9 lbs) sledge hammer to drive the jack into the desired position.

This process was repeated several times, while the men were working under the left wing. The men then left the wing area and began working with the jack under the aircraft's nose.

Let's ask ourselves some questions: As members of the maintenance team, have we lost pride in the quality of our workmanship? Are we guilty of shoddy methods or workmanship such as I have described?

We read and hear that the accident rate is increasing – and has been since 1965. I hear some men say that they are just picking on the mechanics to cover pilot error. Maybe, but if makeshift procedures such as these are widely practiced, is it any wonder that the mechanic gets the blame?

The first class petty officer involved in jacking the aircraft was questioned about his procedures. He stated that his shop didn't have time to send a man to school to learn proper procedures. Have we become so indifferent to quality workmanship and the rules of safety that we are willing to turn our backs on poor maintenance practices; even support them or

ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

attempt to justify them "because we are shorthanded?"

I believe the time has come for each activity and each man to take a look at their safety programs: Are they active, progressive and real or do they exist only in the form of instructions?

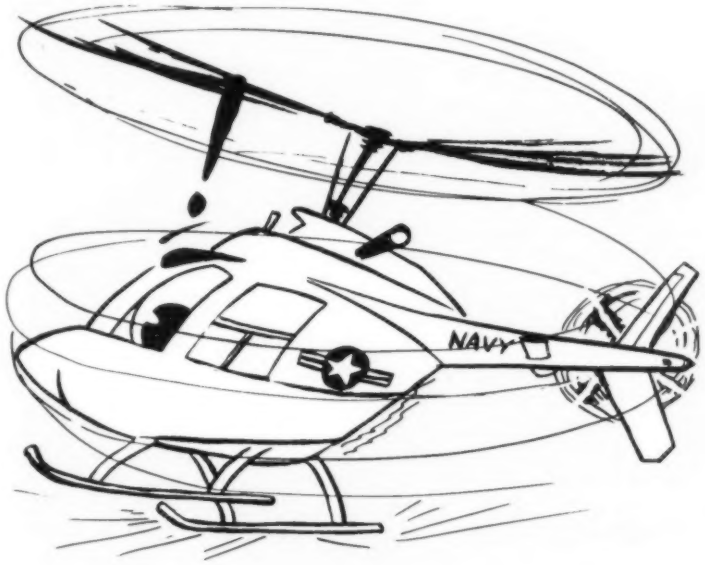
Maintenance Mouse

It has been said many times and it is still true: Whenever untrained men must be used to perform aircraft maintenance there must be an increase in supervision in order to insure that the job is performed correctly – and safely. Obviously, the first class petty officer involved in this incident had abdicated his role as a supervisor and assumed the role of worker (and a poorly trained one at that). Supervisors are often able to show a temporary increase in production by doing the work themselves or by condoning shortcuts. But, in the long run, efficiency and safety are achieved by the team concept which recognizes that untrained men must not only be supervised but guided and motivated by the example of leaders who practice what they preach.

One Ground Accident Cheated

"THE following incident occurred to me at Ellyson Field on an instructor fam flight in the TH-57A. I utilized the checklist found in the cockpit but neglected to ensure that the throttle grip was fully closed. In fact, the throttle was in FLIGHT IDLE. At about 8 percent Ng (gas generator speed) the engine lit off, TOT (turbine outlet temperature) rose to 730°, Ng advanced through 20 percent and was still accelerating when I tried to slow things down. First, I twisted the thottle shut and when I didn't get the desired engine reaction I became confused and opened the throttle thinking I had turned it the wrong way to start with. The engine surged (Ng went past 30 percent), torque began to rise and the aircraft started turning to the right in the chocks. As the helicopter began to turn I applied full left rudder, twisted the throttle back to FLIGHT IDLE and secured the engine with the fuel shutoff valve switch. It wasn't until the rotors stopped that I remembered the flight idle release button. The entire sequence of events, from start to stop, only took a few seconds. I learned to check the throttle in the fully closed position – both by touch and by sight. From now on I depress the throttle release button, twist the throttle closed and then visually check that the release button is actually depressed.

It sounds as if two things set up this potential ground accident. This has all the earmarks of a UH-34 pilot who was accustomed to a throttle grip which can be backed off "all the way." It also smacks of feeling rather than sighting a closed throttle. The idle release button, on turbine engines, is installed for a good reason – to prevent inadvertent throttle movement to the idle cut-off position. All of you recip engine pilots beware of this difference when transitioning to turbine engines.



Hardhats for VP Crewmen

WHILE I was performing inflight maintenance on a doppler radar transmitter located in a compartment below the flight deck, the P-3B hit some turbulence. After bouncing off the overhead twice I can see the wisdom of wearing hardhats in flight when working in confined spaces.

VP Crewmouse

Right you are. While there is no specific requirement for P-3 crewmen to wear hardhats inflight, your suggestion sounds like good headwork from where we sit.

HELP PREVEN

THE WOR

Front View

It has been written that a picture is worth ten thousand words. This is borne out by comparison of the flight suits worn by pilots escaping from a disabled aircraft. Are you dressed in green?

ENT PILOT FIRES

VOR IS NOMEX

NOMEX

Rear View

COTTON

The nomex flight suit is now the single standard summer coverall for *all* personnel assigned to flying duty. NAVAIRSYSCOM message 112212Z of July 69 refers. This message further directed that cotton coveralls no longer be issued to or used by aircrewmen. In addition, nomex flight gloves are the only flight gloves in the supply system authorized for wear by all naval and Marine Corps air crewmembers. For maximum fire protection, wear your nomex flight suit and your nomex flight gloves and save your skin!

"I'M COMING down with my instructor unconscious in the front seat!"

Thanks to the student's presence of mind, no injuries or aircraft damage resulted in this recent and rare case of a hypoxic instructor and a hyperventilating student in a TF-9J but for a while it was touch and go.

The mission was routine – deliver an aircraft tire and get some flight instruction in. However, several small things along the way snowballed into a full-blown emergency when the instructor passed out at FL330.

First of all, the instructor was flying with a mild head cold. Significant in the light of later events was the fact that he removed his oxygen mask twice in flight to wipe

Hypoxia and Hyperventilation

his nose. When the instructor lost consciousness, the student, somewhat understandably, hyperventilated until he, himself, almost got into trouble. At 12,000 ft in the descent the instructor regained consciousness in time to take over the controls and land the aircraft safely.

Let's take the events chronologically.

The flight began with no problems. The tire had been delivered and both men felt well prior to their departure on the return flight. Both men had had plenty of sleep the night before. The instructor had a head cold, as was mentioned earlier but had no trouble clearing his ears. He had not seen a flight surgeon and was not taking medication.

Takeoff was at 1955 with the instructor in the front seat and the student in the rear seat. The student was on 100 percent oxygen from the ground up and the pilot, after checking for fumes and sensing none, went back to 100 percent oxygen. They had experienced no difficulty with their oxygen systems during the day's previous flights.

During the climb they checked their oxygen quantity as the oxygen supply had just been topped off. There was more than 4 liters in the 5 liter converter, the pressure in the system was normal and the regulator blinkers were functioning normally.

During the ascent the instructor removed his mask twice to wipe his runny nose. He felt well until the aircraft reached FL330, 20 minutes into the flight. At this point the student asked the instructor, "What frequency shall we go to?" but there was no reply – the instructor, with his head over to one side, was apparently unconscious. The student, aware that he was now on his own, nosed the aircraft over, changed radio frequencies and decided to land at a nearby naval air station. (He notes in retrospect that he was not feeling well although he was not completely aware of this at the time. He says he was having difficulty with weakness, dizziness and what he describes as tunnel vision.) Presumably at this point, realizing that he might be hypoxic, he pulled his emergency oxygen bottle although he does not remember doing this. He then radioed that he was coming down "with my instructor unconscious in the front seat."

The student remembers leveling off at FL240 and again at 17,000 feet. Meanwhile, he tried to overcome his tunnel vision and focus, concentrating with difficulty on the instruments. He reported afterwards that he felt "tingly" and lightheaded during this period.

At 12,000 feet, he saw his instructor move his head. During the five minutes the instructor had been unconscious the only sound over the intercom had been an intermittent hissing. This leads the student to believe that his instructor's mask may have been partially off. The instructor does not remember whether his mask was on or off when he came to.

On regaining consciousness, the instructor was startled to see the aircraft low and heading in what appeared to be the wrong direction. The fact that the altimeter indicated 12,000 feet, rather than any subjective feeling of discomfort, convinced the instructor when the student told him he had been unconscious.

Still somewhat confused, he told the student to climb back to FL350 and head south. A minute later, however, his faculties had cleared enough for him to realize they were going to land. He took control of the aircraft from the student who was exhausted and still dizzy. When asked to read the approach plate, the student could read the large print but not the small.

At no time had either the instructor or the student noticed any fumes. To be on the safe side, the instructor dumped the cabin pressurization and the student began to feel slightly refreshed by the cool air.

The instructor waved off from his first landing

approach because he felt it was unsatisfactory. Then, as he began to feel worse again, he decided not to wave off his second attempt unless it was absolutely necessary. The approach was good and he made a satisfactory, though slightly fast landing. After taxiing off the runway and shutting down, both the instructor and the student got out of the aircraft without assistance. The instructor was weak, however, and had to be helped into the waiting ambulance.

Investigation began immediately. The instructor, complaining of a severe headache and weakness, was checked by the flight surgeon who found symptoms consistent with hypoxia including cyanosis of the fingernails and exaggerated reflexes. The student was still slightly dizzy but was otherwise in good shape. Extensive tests were made on the liquid oxygen, the masks and the regulators. The LOX was free of contaminants and odors. The instructor's regulator, in the front seat of the aircraft, was found to have a loose elbow assembly and his oxygen mask had a defective laminar seal.

The investigating flight surgeon discounted the theory that these discrepancies in the oxygen equipment completely explained the instructor's blackout. He suspected that the pilot took off his oxygen mask a third time because of his cold or did not replace it securely the second time.

"At an ambient altitude of 33,000 feet the barometric pressure is 3.8 psi with a cabin pressure differential of approximately 3.1 psi," he wrote, "thereby resulting in a cockpit pressure in this aircraft of approximately 7 lbs psi (or an equivalent altitude of 20,000 feet). With a fraction of 100 percent oxygen still reaching the pilot, hypoxia cannot be ascribed to this system leak alone. The pilot noted that he had removed his mask on two occasions to clear his runny nose. Perhaps upon replacing his mask he failed to gain a tight fit or we can speculate that he may have removed his mask a third time and does not remember doing it. He could then have lapsed into unconsciousness to rewaken at 12,000 feet ambient altitude where there would have been enough oxygen partial pressure to revive him."

The "true facts" in such a case can never be determined with certainty; nevertheless, this particular incident constitutes classic examples of hypoxia and hyperventilation, as well as the hazards of flying with a cold.

In another case not too long ago, a pilot flying wing in an air combat maneuvering training flight experienced hyperventilation symptoms and blacked out in a high G climbing maneuver at FL200. He regained consciousness between 13,000 and 10,000 feet, inverted with the nose below the horizon. He was confused and mildly nauseated with dizziness and headache. The culprit in this case seems to be a malfunctioning oxygen mask which made it impossible for the pilot to exhale properly and led him to hyperventilate. When he came to he thought he had hypoxia due to trouble with his mask. The flight leader instructed him to take the lead and, since cabin altitude was 8000 feet, to descend and/or loosen his mask. With coaching from the flight leader he landed safely.

The investigating flight surgeon describes the incident as an example of hyperventilation during a simulated combat training flight.

"Although the pilot is unable to recall numbness or tingling in his face or extremities," the flight surgeon reports, "he did experience apprehension, dizziness, weakness and nausea. The following facts and circumstances would also argue for hyperventilation and against hypoxia as a cause of the mishap:

- the pilot's recollection of increased respiratory rate and depth preceding the onset of other symptoms, both as a result of mission stress and difficulties with his mask;
- our ability to reproduce the pilot's subjective symptoms under experimental conditions by induced hyperventilation;
- free flow of oxygen in the mask as established by the pilot's statement that he encountered no difficulty in inhaling and by a normal bench test of the mask;
- the pilot's report of normal mask function when breathing was intentionally slowed.

"In bench testing the involved mask," the flight surgeon continues, "no malfunction of any kind was detected by an experienced parachute rigger asked to evaluate the mask. On initial examination, I was also unable to see a discrepancy. However, after some experimentation it was discovered that by combining rapid respiratory cycling with sharp exhalations, it was possible to interfere with the exhalation function of the mask. When the mask malfunctioned it was often impossible to exhale through the mask for several cycles even when respiration was returned to normal rate and depth . . ."

The squadron submitted a UR on the mask and, as a result, Naval Air Development Center asked that the mask, hose and regulator combination be sent to ACED (Aerospace Crew Equipment Department) for investigation. Here is ACED's report:

> An examination of the oxygen mask and its components revealed a pin hole in the inhalation flapper valve and laminar seal particles throughout the mask. The pin hole in the flapper valve is considered the most probable cause of the problems reported . . .

> The inhalation flapper valve also shows imperfections in material (thin spots) possibly due to a manufacturing defect. Weak spots, although not the direct cause of the problem reported, offer potential sites for development of pin holes. Other possible causes include moisture, dust and particles of laminar seal, any of which could result in improper seating of the inhalation flapper valve and cause exhalation problems particularly during rapid breathing . . .

Pending additional analysis, ACED recommended: 1) frequent cleaning per CSEB 16 and 2) review of ACSB 140 and ACSB 196 concerning the laminar seal.

The squadron commanding officer emphasized the necessity for pilots being aware of the characteristics of hyperventilation and the ease with which it can occur with pressure breathing equipment.

He recommended that hyperventilation symptoms be demonstrated during the low altitude phase of high altitude/pressure chamber physiological training to insure that all flight personnel in high performance aircraft are aware of its causes and effects.

Hypoxia and hyperventilation share enough symptoms to confuse and, to a certain degree, are produced by the same mechanism – a reduction in oxygen supply to the brain. However, hyperventilation is not as dangerous as hypoxia and can be corrected by breath control. (For an excellent discussion of the subject, please see "Hypoxia, Hyperventilation and Anxiety" by Dr. C. I. Barron, Dr. W. E. Evans, III and Thomas J. Cook in the April 1968 APPROACH.) Your flight surgeon is the man to answer your questions on how to distinguish hypoxia from hyperventilation and vice versa. In the meantime, here is a very general rundown on the subject:

Hypoxia: Hypoxia is a condition caused by lack of oxygen. Symptoms can include visual disturbances, dizziness, lightheadedness, confused thinking, cyanosis, heart pounding and a lack of recognition of the problem.

Hypoxia is rarely experienced below 10,000 feet (OPNAVINST 3710.7D requires all occupants aboard naval aircraft to use supplemental oxygen on flights in which the cabin altitude exceed 10,000 feet and, whenever practical, be on 100 percent oxygen for takeoff and landing. Crewmembers in pressurized combat and combat training jet aircraft are required to use oxygen from takeoff to landing with emergency bailout bottles, where provided, connected prior to takeoff.) If, in spite of precautions, you suspect you have hypoxia, go to 100 percent oxygen, emergency regulator setting and descend to a safer altitude.

Hyperventilation: The human body has a pretty elegant system of breathing control, the mechanics of which your flight surgeon can explain to you. As long as everything goes along all right, you are hardly conscious that you are breathing at all. However, if anxiety, fear or excessive stress and/or unusual resistance to oxygen flow are present, you can unconsciously overbreathe and hyperventilation symptoms can result within seconds at any altitude. When this happens, as explained by Barron, Evans and Cook, the excessive loss of carbon dioxide causes the blood to become slightly alkaline and the blood vessels in the brain constrict, reducing the amount of available oxygen. Hyperventilation can occur under any oxygen condition but is most likely to take place when you are pressure breathing. If in doubt as to whether or not you are hyperventilating, take one deep breath of 100 percent oxygen, hold it for 10 seconds and breathe more slowly.

There's no formula to memorize by which you can distinguish hypoxia from hyperventilation. You have experienced hypoxia in the low pressure chamber. Under controlled conditions on the ground take several very deep breaths and note your subjective symptoms of hyperventilation – lightheadedness, dizziness and tingling. (A relatively few persons are said to be especially susceptible so don't carry this procedure too far.) And, as we said before, talk to your flight surgeon for a more complete explanation of hypoxia and hyperventilation. ◄

B. C. **by Johnny Hart**

WE'D BETTER GET DOWN JOHN THE CEILING IS GETTING LOW.
ALL FURTHER FLIGHTS CANCELLED
GROUND TRANSPORTATION WILL BE PROVIDED
THIS IS THE WORST DAY OF MY FLYING CAREER.

Sierra Survival

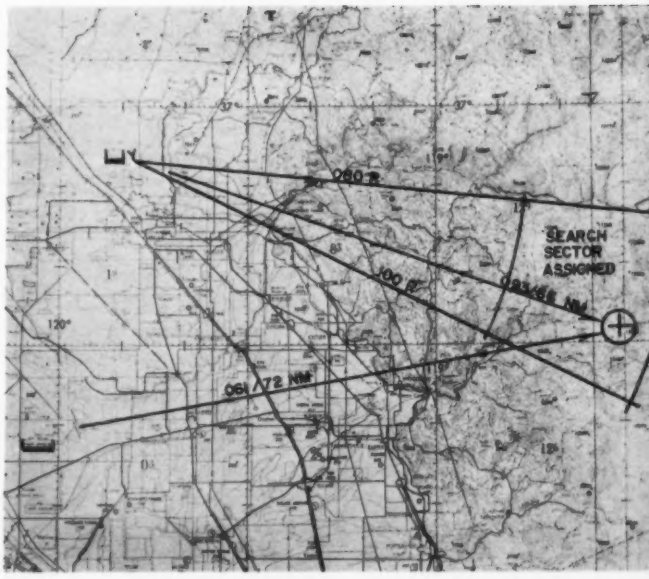
IF LADY LUCK had not been smiling on the pilot and observer in this story, their failure to wear complete winter flight gear could have cost them their lives when they were forced to spend the night in a wrecked A-1E at 12,300 feet in the High Sierras with temperatures below 0^0F and winds up to 100 knots. The fact that after the forced landing the aircraft remained substantially intact and did not burn afforded the injured men shelter. With the assistance of an Air Force paramedic they made it through the night and were rescued the following morning. (The accident, itself, was attributed to undetermined material failure/malfunction of the engine system/component.)

It all began with the loss of a TA-4F in the mountains on a day in late February. Under Air Force coordination, a search began with the A-1E assigned a high probability area which included the upper reaches of the Kern River Canyon and the mountains along its western ridge. Both the pilot and the observer (also a qualified pilot) had taken part in the morning search. Low ceilings had hampered visibility but by afternoon the weather over the canyon and ridge was crystal clear with high winds kicking up swirls of snow around the mountain peaks. After working several lesser canyons and ridges, the A-1 crew proceeded north to search the east side of the Kern River Canyon.

Shortly after reversing course, the pilot and observer spotted a forested plateau on the canyon's western ridge which seemed to warrant closer scrutiny. They set up a search pattern running east/west across the wooded area with a 90/270 turn at the end of each pass.

When an event is over, small occurrences take on significance. The men recalled later that as they had crossed two frozen lakes on their first pass the pilot had remarked that the lakes would be a good place to ditch if they needed to. The observer remembered that before the flight he had plugged the candy machine and quipped that the candy would taste good for supper.

During the procedure turn after their third pass, the



aircraft began to lose power and airspeed dropped sharply from 150 to 90 knots. The pilot went to full increase RPM, full throttle and checked the mixture rich. The engine continued to lose power and, within approximately five seconds of the first indication of trouble, failed completely. Committed to ditch, the pilot picked a large snowbank on top of a small ridge slightly to the right of course in preference to the bottom of a canyon to the left.

The observer had been looking out of the starboard window in the front cockpit with his shoulder harness unlocked just before the engine quit. He described himself as riding "fat, dumb and happy in the right seat," totally unaware of their predicament until the pilot yelled, "We're in trouble! We're going in!" In an instantaneous reaction he reached down and locked his shoulder harness, grabbed the canopy handle with his right hand and braced his left hand on the dash. He glanced at the airspeed indicator. It read 90 knots. The engine very quietly ran down.

The aircraft hit hard, almost straight down in a flat attitude, skidding only a plane's length before coming to a stop. Although the smell of fuel fumes was strong, there was no fire.

"I never lost consciousness," the observer recalls. "I can clearly remember seeing red and feeling excruciating pain racing up my backbone to my brain. Then it was all over. I sat there mildly stunned and hurting like hell but very glad to still be able to observe these discomforts."

The observer looked over at the pilot who was dazed and obviously hurting. *(Both men had sustained compression fractures of the spine. – Ed.)* The pilot shut off the fuel and mags.

"We just sat there and moaned and groaned for a few minutes," the observer continues. "It is questionable in my mind whether or not in our stunned and injured

conditions we could have exited the wreckage post haste had the aircraft caught fire."

With the altimeter reading 12,000 feet, compass reading 330 degrees and a mountain peak an estimated 1500 to 1800 feet above the wreckage and to the right, the observer plotted their position. He pulled out the PRC-63 transceiver which he routinely carries in his flight suit pocket and let the beeper blare away for a few seconds before broadcasting a Mayday report. On his third call he received a reply and five minutes later a TA-4F came into view and made visual contact. The TA-4F was followed shortly by an Air Force C-130, the on-scene commander. The first intention of the on-scene commander was to drop a paramedic but winds were too strong. The dummy load in the test chute went by, the observer says, "like it was strapped to a J79 in burner." Helicopters were then sent for.

"We sat back and tried to make ourselves comfortable," the observer states, "but it was impossible – we just hurt too darn bad.

"Both of us commented on wanting a drink of water but neither of us had a water flask and our bird was minus the two canteens which normally hang on the bulkhead behind the copilot's seat. They may not have been there before the crash or they might have been torn loose on impact, I'm not sure which. I guess we could have melted some snow but it didn't seem worth the pain and effort to crawl outside for it. Time passed at a snail's pace. Minutes seemed hours."

The downed aircrewmen, still mobile in spite of their painful injuries, went into the rear of the aircraft and broke out the parachutes.

Continued

Neither the pilot nor the observer was dressed for the occasion. The pilot was wearing a nomex summer flight suit, regular underwear, an olive green winter flying jacket, a survival vest, flight boots, heavy wool socks, nomex flight gloves, a Mk-2 life vest and dual visor-equipped helmet. ("I wish I had worn long johns!" he later commented ruefully.) The observer was wearing a winter flight suit over regular underwear, summer flight gloves, flight boots with two pair of athletic socks, a Mk-2 life vest and a helmet.

"I was probably warmer than the pilot," he notes, "and when I got wrapped up in the parachute, there was no problem keeping warm. I'm sure, however, that if we had been out in the wind or had been required to dig a snow shelter or something similar that it would have been all over because the wind was just something fantastic. In about three minutes outside you were chilled to the bone."

Although it wasn't actually snowing, high winds were whipping up the snow on the ground. The survivors describe the wind velocity as well above 50 to 60 knots and estimate that later in the night the winds may have risen to as high as 100 knots.

Between 1700 and 1730 a Marine helicopter and then an Air Force helicopter arrived. The helos had great difficulty spotting the downed aircraft but finally located it just as darkness came. Because of the high winds and blowing snow, the helos were unable to either hover or land. Neither helo was equipped with a hoist to lift the survivors out.

"Both choppers made numerous attempts to hover close to the canyon floor about a mile to our left and 500 feet or so below us," the observer states. "Their intent was to have us leave the wreckage and make our way down to their position where they hoped to hover close enough to the ground to lift us aboard. Both John and I got out of the aircraft. John was the first one to step off the wing into the snow. He promptly sank in up to his chest and only managed about three or four steps before he became fatigued.

"Upon seeing John's predicament I stayed on the wing and radioed the helos that the snow was too deep to travel in. We thought about sliding down the hill on some pieces of cowling but immediately discarded that idea since it would have been impossible to get back up the hill to the shelter of our aircraft if the helos were not able to effect a pickup. Besides, I was already losing the use of my fingers although we had only been outside for a few minutes. I told John we had better get back inside and then I crawled into the front cockpit. I could see John was stuck so I went to the rear cockpit and threw him one end of an open parachute and pulled him in through the hatch. He brushed off most of the snow,

then wrapped himself up while I went back to my radio in the front cockpit to see what else our rescuers could come up with."

By now it was dark and the observer could see the helos' lights as the choppers circled in the canyon below. When the Air Force *Huey* lost visual contact with the survivors, the observer removed the red lens from his flashlight and waved the light outside the cockpit. The helicopter made a pass and dropped a paramedic and supplies. The paramedic landed up to his armpits in snow and slowly made his way to the aircraft, a distance of 30 to 40 feet. After checking with the injured survivors he decided that they could not be rescued that night and that he would stay with them until morning. He entered the aircraft through the front hatch and he and the observer forced the canopy shut again.

"I proceeded to tear the padding from the seats and use parachutes to line the floor as much as possible. I knew the aircraft would get cold during the night," the paramedic reports. "I then opened the six parachutes that they were carrying and used them as more padding and also as sleeping bag material. After the crewmembers were lying as comfortably as they could, I opened the three MC-1 sleeping bags that I had brought with me and put these over and around them. We all then settled down for a long overnight wait. The two survivors seemed to rest fairly well during the night even after the cold set in. I would estimate that the temperature dropped to nearly 20^0 below zero during the night. I could not light any of the candles or canned sterno which I had with me due to the leaking aircraft fuel and hydraulic fluids."

"Although I was never worried about being rescued," the pilot said later, "this was probably the longest night of my life!"

The next morning at 0700 the survivors and the paramedic heard the C-130 overhead again. They called him on the radio and found, in the pilot's words, "that fellow had been hanging around all night long." This, the pilot writes, was greatly appreciated.

The first helo to arrive on the scene was the UH-1F which, again due to the high winds and terrain, could not hover or land. An HH-43 then came in with a hoist and sling for the rescue but was unable to get any closer than 50 feet to the wreckage. With the assistance of the paramedic, for whom the survivors had nothing but praise, both pilots and the paramedic were hoisted from the waist-deep snow and their survival ordeal was over.

Board's Conclusions

Here are the investigating board's conclusions in this case:

- The cause of the accident was power loss/engine failure.
- The cause of the engine failure is undetermined.
- The pilot displayed excellent technique and professionalism in executing a forced landing in the only suitable location available.
- Immediate location of the wreckage is attributed primarily to the observer's use of his own PRC-63 survival radio and, secondarily, to the number of aircraft in the area actively involved in the search for the missing TA-4F.
- The NAS Lemoore rescue helicopter responded immediately and probably could have effected a rescue the same afternoon had it been a vehicle with a high altitude capability.
- The aircrewmen were not adequately clothed for survival under the environmental conditions existing at the scene of the accident.

Recommendations

Recommendations were:

- That each pilot be issued a PRC-63 survival radio or similar voice communication radio prior to each flight.
- That NAS Lemoore be permanently assigned a rescue helicopter capable of rescue in all environments encountered by NAS Lemoore aircraft.
- That continued emphasis be placed on the importance of dressing for the worst conditions over which a flight will traverse.

Continued

In his endorsement to the investigation report the commanding officer of the squadron wrote that he was "chagrined by the fact that the pilots involved were not fully clothed for extreme winter conditions."

"Waffle weave underwear and winter flight suits are stocked in the squadron in quantities sufficient to meet the needs of all pilots," he wrote. "This has been standard policy in order to encourage their use by minimizing the trouble normally encountered in drawing such gear from station flight gear issue. Briefings on cold weather operations/survival had been conducted and both pilots were fully aware of the potential in event of a survival situation. Instructions have now been issued making the use of winter flight gear mandatory."

The C.O. praised the actions of the pilot and observer and commented on the radio situation.

"Had it not been for the exceptional pilot technique in executing the emergency landing, the proximity of other search aircraft and the copilot's broadcast of his precise location by means of the PRC-63 survival radio which he carried, this accident could have had a tragic conclusion. Both pilots have indicated that because of the pain from their injuries, it would have been difficult or impossible to reach the PRC-49's carried in the seat pack of the parachutes. Accordingly, a system by which pilots check out PRC-63's as they man aircraft has been instituted. Additional steps are being taken to increase the number of available survival radios for pilot issue. It is the firm opinion of this endorser that a valid requirement exists for PRC-63 radios to be issued and carried by all pilots and that they should be made a standard article of survival equipment in ConUS as in WestPac."

ComNavAirPac concurred with the board's conclusions and recommendations as modified by subsequent endorsers' remarks and subject to the following comments:

- "Presently there is no Navy helicopter which has the performance characteristics to accomplish rescue missions in the environment which was present in this accident. Every effort, however, is being made to improve the SAR posture of AirPac air stations within the constraints of available helicopter assets.

- "ComNavAirPac concurs with the board on the desirability of each pilot being issued a PRC-63. Procurement schedules are programmed with that goal in mind. As an interim measure, PRC-33 beacons are available and should be drawn from normal supply channels." ◄

APPROACH is indebted to ATKRON 125 and, in particular, to LT John R. McDaniel and LCDR Gary W. Lubbers, the pilot and observer in this survival story, for their valuable supplemental information. Here is LCDR Lubbers' summation:

"In reflection, as with most situations of this nature, there were several lessons learned. *First,* unless you've done some real winter camping you can't begin to imagine how cold and cruel nature can be on the side of a mountain in February. In my opinion, it is impossible for the pilot of a single engine aircraft to dress warmly enough to survive without some sort of shelter and still maintain even a minimum amount of movement in the cockpit. With the normal flying apparel, in an ejection or bailout situation you will most likely freeze before you reach the ground. I was dressed a bit warmer than John. Even so, once outside the shelter of the aircraft, my fingers and nose became numb in about five minutes and the rest of me was chilled to the bone. Longjohns might have helped some but not enough.

"Second, getting out of the wind is the most significant improvement you can make in a situation like ours. I attribute our success to the fact that the aircraft stayed intact. If ours had been an ejection situation, I would make my first course of action to dig a hole or cave in the snow. Although the temperature was only -13^{0}F the computed chill factor reached -70^{0}F during the night. Every minute you're exposed to the wind lessens your percentage of survival considerably.

"Third, the advent of pocket-sized survival transceivers is the best thing to come our way since sliced bread. The old adage about packing your survival vest as if you were going to stay a week may be fine for some guys but I'll gladly trade the whole works for a good PRC-63. I feel sure that we would not have even been located until the next day, if then, had it not been for this beautiful little piece of gear . . .

"I'm sure that a lot of Monday morning quarterbacking can be done in this case and I hope this story will inspire just such attention."

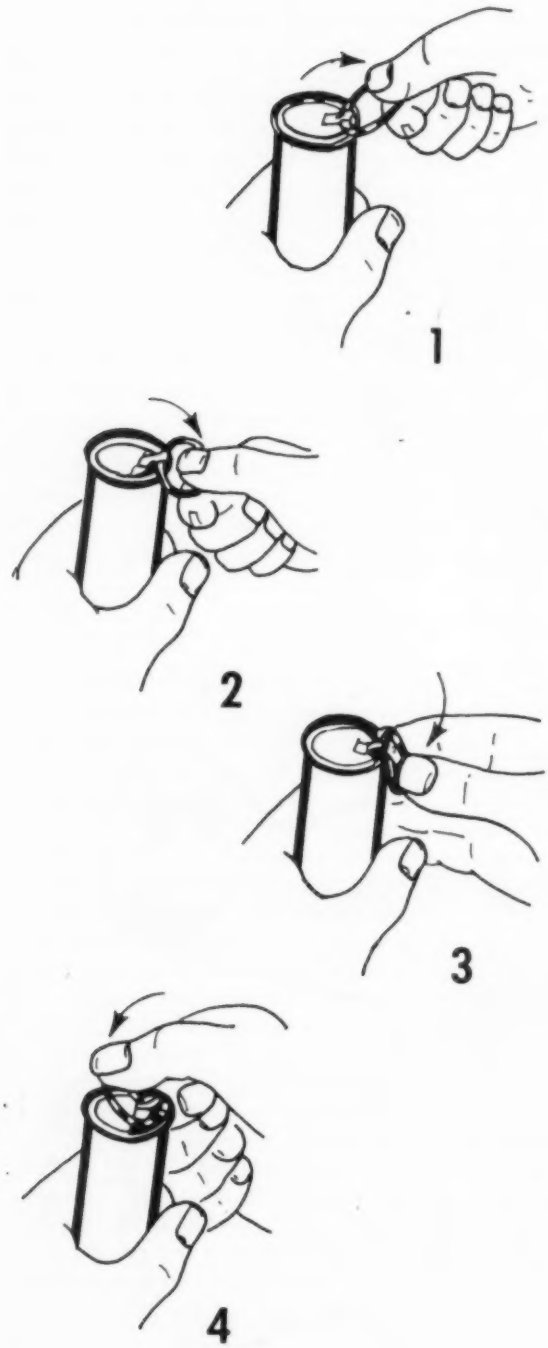
LCDR G. W. Lubbers
ATKRON 125

Great Aviators I Have Known

By LCDR W. J. Isenhour

LCDR Smartly Buetokks, a Brewster Buffalo pilot of considerable repute, is credited with having performed (inadvertently) the first ejection escape from an aircraft and contributing to the further development of egress systems as they are known today.

Smartly had as a habit the carrying of his Westchester-Smitherington 950 double magnum (full loaded of course) whenever going flying, in case a covey of snow geese or a grazing group of mud oxen should be encountered. (After all, the wardroom can always stand a change from the traditional filet mignon and prime rib dinners that prevail.) However, while attempting a rapid draw of the magnum from his sturdy shoulder-side-thigh holster, it fired all by itself, and Smartly was unceremoniously departed from his Brewster in much haste! Subsequent parachute descent was uneventful, and save for some slight discolorations (red face and purple namesake) Smartly returned to the wardroom much acclaimed and a hero among all. (Smartly now carries an unloaded 3mm peeshooter in his navigation bag just in case!)



What's New in Signal Devices?

LAST month's issue of APPROACH carried a rundown on personal survival equipment requirements and the latest word on developments in this field. (Please see "Scenario for Survival," page 25.) That article mentioned that Chief of Naval Operations has established a requirement for a red/green, Mk-80 signal flare for the pen gun. New red and green flare-type ammunition (Mk-140) for the .38 cal. pistol is under procurement. In addition the Bureau of Naval Ordnance has come up with an improved version of the Mk-13 Mod 0 distress signal which will be ignited by a striker type device. Fleet introduction is expected by the end of FY 70.

In the meantime, we must still rely on the Mk-13 Mod 0 distress signal. The time to familiarize yourself with the employment of this signal is now – *not* when you're bobbing around in the water in your flotation gear or your raft and it's so dark you can't see the end of your nose. For those of us who do not know the correct method of using this device and for those of us who just need a refresher, here's the way it goes:

1. Tear cap from end to be ignited.
2. Flip pull ring over signal rim (Fig. 1).
3. Push ring down to break seal (Fig. 2).
4. If seal doesn't break, push ring until it bends against case (Fig. 3).
5. Flip bent ring back to original position and use as lever to break seal (Fig. 4).
6. Ignite signal by quick pull on ring.
7. Hold at arm's length 45 degrees from horizontal (out over water if in pararaft).
8. If smoke signal flames, douse momentarily in water.
9. After using one end, douse signal in water to cool. Save for use of other end if needed.

Do it right and they'll find you and take you home!

Burn Protection

AN EF-10B crashed into a grove of trees and burned; the pilot, whose shoulder harness was unlocked, hit the instrument panel and was knocked unconscious. The ECMO (ECM operator) unstrapped himself, then freed the pilot and dragged him through the starboard windscreen area and over burning debris to an irrigation ditch 30 yards away. He first attempted a fireman's carry, then laid the pilot on his back and pulled him by the collar and shoulders of his flight suit. The pilot remained unconscious for 10 minutes. The squadron C.O. states that he has no doubt that the ECMO was wholly responsible for saving the pilot's life.

Both men were wearing flame retardant nomex flight suits. In the pilot's case a non-flame retardant suit would probably have burned, causing fatal injury. As it was he had two deep third-degree burns underlying a small hole in the suit. The suit also had a large scorched area, indicating exposure to intense heat. The ECMO sustained only a first-degree burn of his right wrist above his glove.

"Both the pilot and the ECMO owe their relatively light burns to the nomex flight suits," the C.O. writes. "The massive amount of heat the pilot experienced around his legs due to the resulting fire would certainly have caused irreparable damage without the fireproofing of the suit. As difficult as it was, the rescue might not have occurred if the ECMO's nomex suit had not afforded him a great measure of protection against the fire."

Had the pilot had his shoulder harness locked his cerebral concussion and other injuries would probably have been averted, the investigating flight surgeon states. The pilot's helmet, the flight surgeon said, prevented a fatal head injury.

Direct Hit

A CH-46A engaged in resupplying Marines in the field was loaded for the fifth sortie and cleared to taxi for takeoff. As the pilot taxied the aircraft to the exit taxiway, the forward blades struck the aft stationary blade of another helo. Here's an interesting quote from the crew's narratives:

"The blades hit and we headed for the other aircraft. I was bounced around and my head kept banging against the side of our aircraft. The .50 cal. gun swung around and hit my APH-6 helmet. I'd have probably gotten hurt if I hadn't worn my helmet."

Crew Rest

CREW REST is vital, especially in the Vietnam air war, because of the emotional and psychological stresses placed on the individual. Routine and habit are dangerous. Therefore every effort should be made at all levels to initiate and encourage aircrew rest periods, including rotations periodically out of the combat zone, to stimulate fresh enthusiasm and break old habits. This has been done on the squadron level by providing one day per week in an off duty status. This should be encouraged and followed at all levels.

From an MOR

Street Shoes

AN F-4J pilot who had to eject was wearing street shoes. Luckily, he didn't strike anything with his feet on his way out and didn't break his ankles when he landed. *OpNavInst 3710.7D, General NATOPS, states: "Flight safety boots/field shoes (ankle high lace type) shall be worn by all crewmembers and passengers in combatant aircraft . . . "*

Shortcut

WHILE installing the starboard UHT (unit horizontal tail) cylinder on a TF-8, an AMH2 used his right index finger to align the hole in the end of the actuating rod with the hole in the structural portion of the UHT. He was using his weight to maintain the position of the UHT; when he shifted his weight, the UHT moved. The internal friction of the actuating cylinder prevented the rod from moving, thus creating a very effective shear which cut off the tip of his finger.

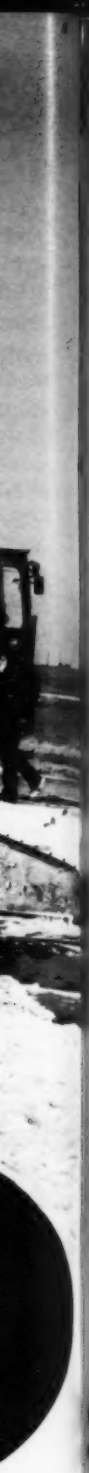
The squadron report describes the petty officer as a well-qualified hydraulicsman. "However, in this particular instance," the report states, "he created a hazardous situation by not using good headwork."

Although no mention of it is made in the Maintenance Instructions Manual (MIM), the report states, a block of wood can be placed between the structure of the fuselage and the UHT, preventing any motion of the UHT. This block was readily available but was not used since the UHT must be repositioned during the installation and use of the block is generally considered too time-consuming. The command is submitting a recommendation for a change in the MIM procedures that will include a method of immobilizing the UHT during this operation.

This incident occurred just 24 hours after the completion of an extensive "Back in the Saddle" program in the squadron designed to remind personnel of the hazards of their work. One of the major hazards discussed: trying to create shortcuts!

Death is Cheated But . . .

FOD



THE A-4F pilot took off and climbed out at 250 knots with military power. All engine instruments were normal but passing 8000 feet, a severe "thud" shook the airframe and the engine flamed out. The throttle was retarded to IDLE CUTOFF and the EGT remained at 600°, but there was no fire warning light or other indications of fire.

The pilot declared an emergency and initiated an abbreviated airstart procedure (he failed to deploy the ram air turbine). A relight was obtained as the aircraft descended through 4500 feet; however, any power setting above 80 percent resulted in an engine overtemp.

The pilot was in the vicinity of a field with a 13,000 foot long runway but had insufficient altitude to make the high key position for a precautionary emergency approach so he maneuvered the aircraft to intercept the pattern at a lower point. He arrived at the 90 degree position in a clean configuration and slightly high. At this time the pilot lowered the landing gear and selected full flaps. At the 45 degree position the aircraft remained slightly high so the pilot extended speed brakes. He planned his touchdown for a point 1500 feet from the approach end of the runway.

Immediately after the speed brake extension the engine shuddered mildly and again flamed out. The pilot placed the speed brake switch in the retract position but, unaccountably, the speed brakes remained extended. At the same time, the pilot observed the EGT to be exceeding 800° and, using the side mounted mirrors, could see large flames coming from under the aft fuselage. This was the pilot's first confirmation of a fire.

When the pilot turned his head to further ascertain the extent of the fire, the right fitting on his oxygen mask came unfastened and the mask dangled by the left fitting. The pilot then turned off his oxygen supply in order to reduce the possibility of a cockpit fire.

The pilot considered ejection at this time but his position and heading presented the distinct possibility that the aircraft would crash into the NAS fuel farm or other facilities in line with his flight path. He decided to remain with the aircraft, at least until he could align it with the runway. But, after completing his turn to the runway heading, he again made the decision not to eject because he felt the aircraft was approaching the limits of the seat envelope due to its high sink rate. He felt he could make the runway and could then eject on the runway (with a zero sink rate) if the fire continued and engulfed the aircraft.

Witnesses on the ground observed the aircraft about this time – on a close final – in a flat attitude, a high sink rate and flames 20 to 30 feet long emanating from the tailpipe. The pilot rotated the aircraft to a nose high attitude and touched down on the overrun. The landing was hard, resulting in a blown starboard tire and the subsequent collapse of both main mounts. (The aircraft at touchdown weighed about 16,500 lbs. *The recommended max gross weight for a minimum rate descent is 16,000 lbs; for a normal landing it is 14,500 lbs. – Ed.)* The aircraft skidded along the runway on the tailhook, nosewheel and outboard bomb racks. Effective directional control was maintained with rudders. After 2653 feet of ground travel, an unknown part of the aircraft engaged the E-15 field emergency arresting gear which stopped the aircraft after a run-out of 125 feet.

When the aircraft came to rest, the pilot decided against opening the canopy immediately, intending to observe the intensity of the fire and eject on deck if necessary. However, it appeared that the fire was being carried aft by the prevailing wind so the pilot opened the canopy normally, released the lap belt and shoulder harness fittings and exited the aircraft uninjured. The crash crew arrived immediately and extinguished the fire but the aircraft received strike damage. (See photo.)

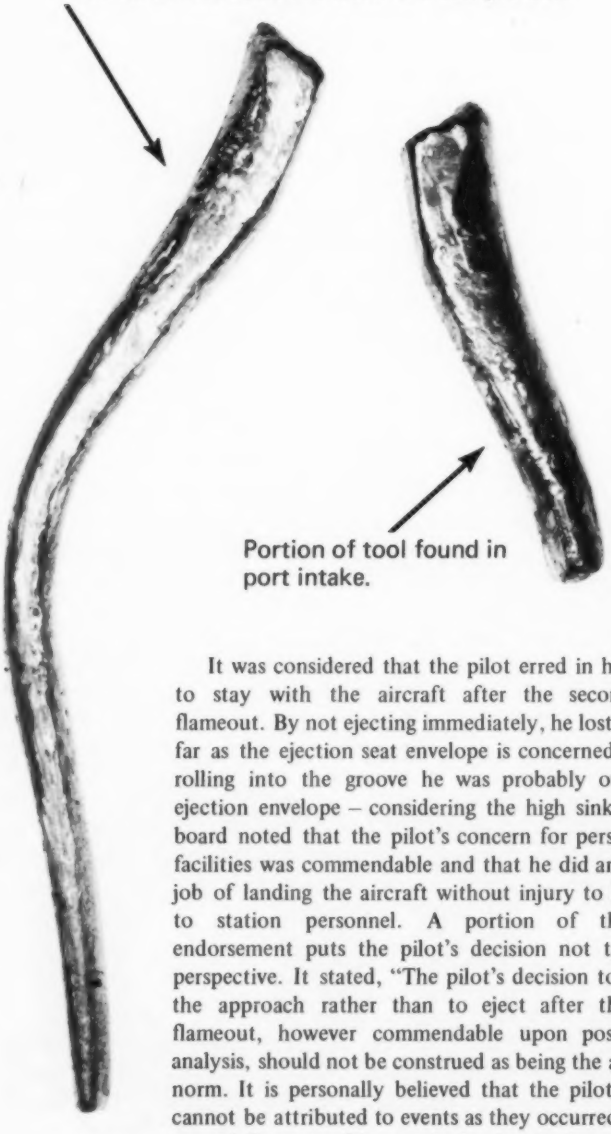
Several material failures occurred between the time the engine first flamed out and the final stop on the runway, e.g., failure of the speed brakes to retract during

strikes again!

the approach (hydraulic lines were burned through). The investigation which followed gave thorough consideration to all these factors but space does not permit a complete discussion of them here. Instead we will confine the discussion to pilot factors and the primary cause of the engine failure – FOD!

Hand tool used for comparison.

Portion of tool removed from N-1 compressor.



Portion of tool found in port intake.

It was considered that the pilot erred in his decision to stay with the aircraft after the second engine flameout. By not ejecting immediately, he lost ground as far as the ejection seat envelope is concerned and after rolling into the groove he was probably outside the ejection envelope – considering the high sink rate. The board noted that the pilot's concern for personnel and facilities was commendable and that he did an excellent job of landing the aircraft without injury to himself or to station personnel. A portion of the C.O.'s endorsement puts the pilot's decision not to eject in perspective. It stated, "The pilot's decision to continue the approach rather than to eject after the second flameout, however commendable upon post-accident analysis, should not be construed as being the acceptable norm. It is personally believed that the pilot's survival cannot be attributed to events as they occurred after the second flameout. The conclusion by the board that the decision after the second flameout should have been to eject is highly endorsed as the action desired by present command policy."

The Primary Cause of the Accident

The initial inspection after the accident revealed a metal object in the port intake of the aircraft. It was compared with various tools and determined to be a portion of a handle from a pair of seven and one-half inch diagonal wire cutters. During further inspection of the engine another metal object was found lodged in the six o'clock position of the fifth stage of the compressor section. This object appeared to be the opposite handle of the same tool. (See photo at left.)

The primary cause of this accident was determined to have been foreign object damage (seven and one-half inch diagonal wire cutters) which caused catastrophic damage to the engine compressor and the turbine. (See photo below.)

How it Came About

The plane captain's daily/preflight inspection conducted before the flight disclosed a need for servicing the CSD (constant speed drive). This discrepancy on the CSD was processed through maintenance control and a qualified ADJ3 from the check crew was directed to service the system.

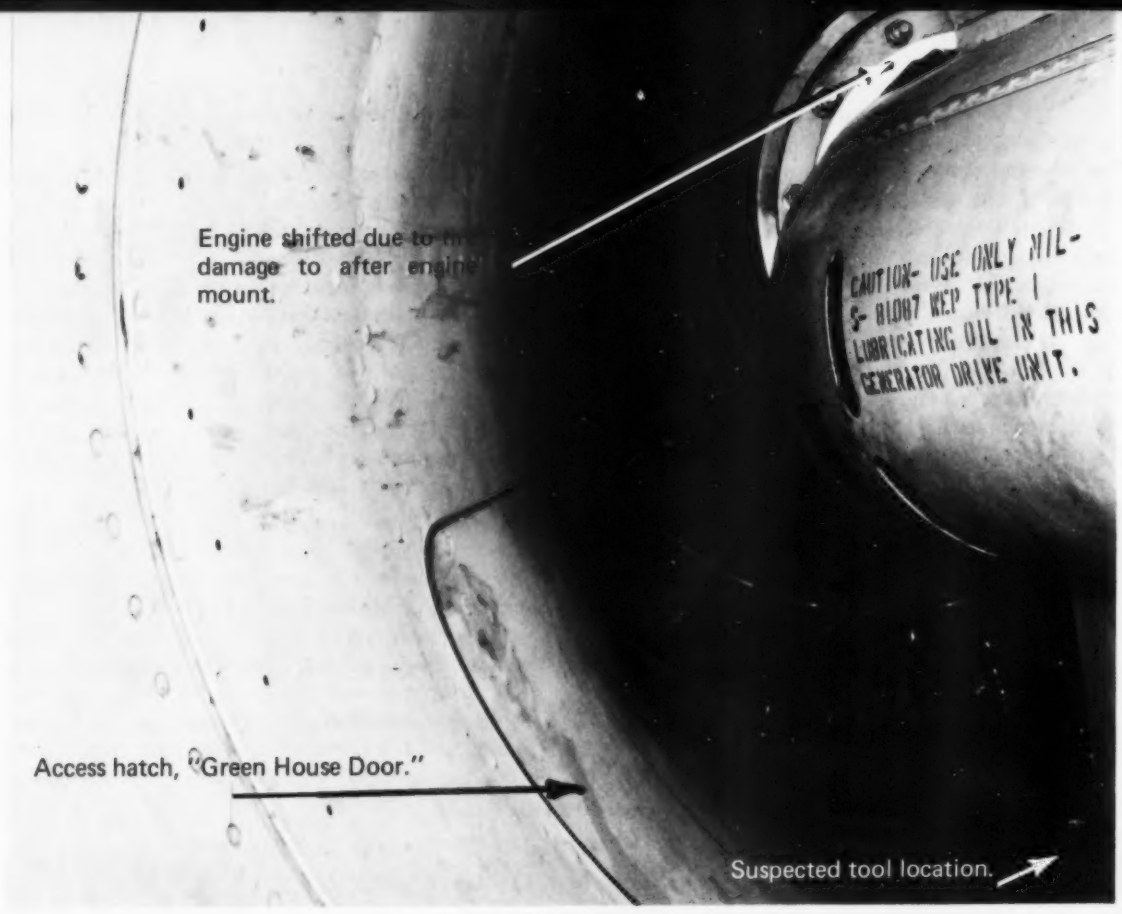
Interviews with power plants personnel and the check crew disclosed that CSD servicing is accomplished as follows:

- The maintenance man thrusts his head and shoulders through the access area. This makes it difficult or impossible for him to make use of tools he may have on a tool belt or in his trouser pockets. To alleviate this problem, servicing personnel normally place their tools in the starboard intake prior to entering the access door.
- The tools normally used for CSD servicing are safety wire pliers, a one-fourth inch drive ratchet, a one-inch wrench, a flashlight, a plastic bottle of Mil-S-81087A *and one pair of diagonal wire cutters*. (The wire cutters are sometimes used to grip the neck of the servicing bottle when filling the CSD.)

The ADJ3 who serviced the CSD was interviewed. He stated that he did make use of the tools already mentioned but that he used *six inch* wire cutters instead of the seven and one-half inch size.

The possibility that the tool had been left in the aircraft during a calendar inspection which had recently been completed was considered but was discounted because the aircraft had since undergone a high power turnup and a 1.5 hour test flight prior to the flight

Port view of turbine section.



The damage as viewed from starboard intake.

during which the accident occurred. The test hop had included aerobatic maneuvers and it is considered that the tool would have been ingested on that flight had it been left in the intake during the calendar inspection. It was concluded that the wire cutters were left in the intake during maintenance work prior to the flight on the day of the accident.

The Pilot's Preflight Inspection

The pilot stated that his preflight inspection was more than complete since he had not flown the A-4 recently. There is no intent to dispute his statement in this regard but an informal sampling of pilots in the local area disclosed that many admit to relying on the plane captain for inspection of the engine intake ducts. A complete inspection of the port intake is easily made by the pilot because the entrance ladder is on that side, but a complete inspection of the starboard intake requires the pilot to lean precariously out of the cockpit for a good view.

The Plane Captain's Preflight

There is considerable evidence that the plane captain made a thorough preflight of the aircraft prior to the CSD servicing. But, it should be noted that it is squadron policy for the plane captain to make a final check of the intakes after the pilot has strapped in. In this case the plane captain who sent the aircraft out (a different man from the plane captain who performed the daily/preflight inspection) notes that he forgot to make this final check.

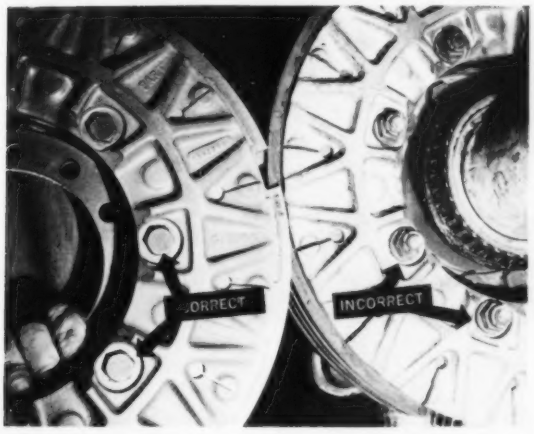
Tool Control

Inadequate tool control followed by an inadequate final preflight inspection caused this accident. Measures designed to insure accountability of tools can and should be improved. Tool control should also be a primary and continuing concern of supervisors and quality assurance personnel, but as the C.O. noted in his endorsement of the AAR, "The individual who performs the work is the key to any workable system of tool management/material safety. Even the most ironclad control is dependent upon the individual on the job maintaining a professional attitude."

FOD is a potential killer! Maintain strict tool accountability . . . . . *and always insure a complete and thorough preflight of the aircraft.* ◄

MURPHY'S LAW *

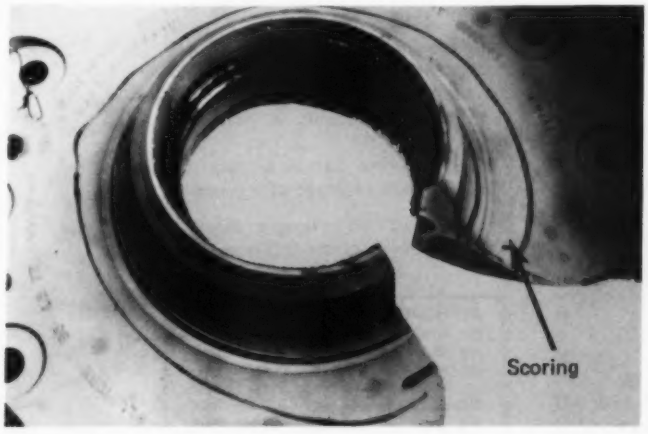
E-2A/C-2A MLG Brake Tie-bolt Installation Murphy



A NUMBER of cases have been reported where the eight (8) brake tie-bolts which secure the brake assembly, PN 9560538, on E-2A and C-2A aircraft, have been installed backwards (see photo above). The impact of the MLG on landing touchdown causes downward rotation of the brake assembly and rotation of the wheel. If the tie-bolts are installed backward the result is that the tie-bolts are brought in contact with the rotating wheel, causing the wheel to be scored (see photo below). This could result in wheel failure and an aircraft accident.

The correct installation of the tie-bolts is for the bolt-heads to be inboard (facing the wheel).

Maintenance personnel should be aware of the possibility of this Murphy and guard against its occurrence.



* If an aircraft part can be installed incorrectly, someone will install it that way!

Reach for the stars. Although you may not get a star, you won't wind up with a hand full of mud.

Leo Burnett

Letters

Strobe Light

FPO, New York – At present, the strobe light is literally of no value when it comes to a light for finding things in a liferaft or finding one's way in a survival situation at night. Why not widen the present case and install a one-cell pencil flashlight on the side?

Anymouse

• The strobe light is not designed to help the survivor find things or make his way in the dark. Its purpose is to aid searchers in locating the survivor. Reliable, effective, simple, small and as light-weight as possible, it comes as near to fulfilling its purpose as anything yet devised, in our opinion. We do not think that adding a penlight would be an improvement. The penlight can be carried easily in a flight suit pocket or on the survival vest.

Soft Hoses

NAS Norfolk – Why don't we get the soft-hose anti-G suits remanufactured instead of being issued the stiff-hosed monsters?

Anymouse

• The ACED (Aerospace Crew Equipment Department) is currently modifying 150 anti-G suits for further fleet evaluation. The modifications include a return to the soft hose and to pockets similar to those on the Z-3 anti-G suit.

"Grounding" Boarding Ladders

FPO, San Francisco, Calif. – The line shack and the actual line are quite often some distance apart, thus making proper stowage of boarding ladders a real problem during a heavy launch. Naturally, the solution is to place the ladders on the deck clear of the aircraft. This is perfectly acceptable until taxi time arrives when, as most line officers and plane captains will attest, the entire line becomes airborne due to jet blast. This situation is, quite obviously, a hazard to both personnel and aircraft.

To cancel this unscheduled launch of ladders and fire bottles, try this simple and inexpensive solution: Tie a restraining strap, constructed of a 15-inch strip of Type 6 nylon webbing, a D-ring and brass snap (found in most "free bins") onto the ladder (see photos 1 and 2). When the ladder is removed from the aircraft it is simply hooked into a nearby padeye. Result: a "grounded" line (see photo 3).

This squadron has been using this idea for about six weeks with complete success.

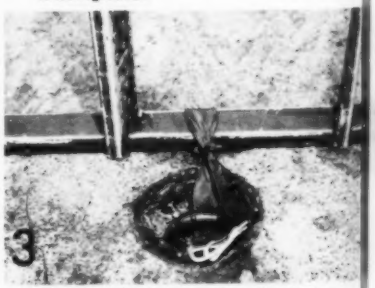
J. P. Park
ASO VA 216

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

This is the restraining strap.

Position of restraining strap when ladder is being used.



The ladder is secured to the deck.

• Looks good, but make certain the straps are fastened far enough down the ladders so as not to be sucked into intake ducts when the ladders are attached to aircraft that are turning up.

Amplification

Bethpage, Long Island, N.Y. – A little amplification regarding the *Murphy's Law* spread on pages 44 and 45 of the Aug 1969 issue is felt to be in order. In spite of cable color coding and double swaged ball fittings, the problem of cross-connecting these cables was recognized back during the days of the single seat *Cougar* program. Authorization for *Murphy-proofing*, however, was not forthcoming until the advent of the two seat TF-9J program. Apparently, because the two seat version was the only *Cougar* then headed for the Training Command, the modification authorization was limited to that particular model. The *Murphy-proofing* was accomplished by utilizing oversized swaged ball fittings on one set of cables (if memory serves, it was the up cable) and standard size fittings on the remaining set.

The job of cross-connecting the cables without backing off on the cable tension adjustment, though possible, can be back-breaking which might account for the limited number of occurrences over the years.

H. Luce
System Safety Engineering
Grumman Aircraft Corp.

• Thank you for the additional information. It should be of interest to all *Cougar* maintainers – and operators.

Of Interest to Navy Aero Club Members

NAS Corpus Christi, Tex. – Navy Aero Club T-34 aircraft are required by FAA rules to have FAA Aircraft Specification No. 5A3 which is *Beech Aircraft Corporation* drawing 45-00 0060, kit No. 45-326 incorporated prior to certification by FAA. This requirement changes the flight control characteristics somewhat from that which naval aviators become accustomed during primary training in unmodified T-34 aircraft.

Commanding Officer
NAS Corpus Christi

• We have learned from the Beech Aircraft Corporation through separate correspondence that T-34 aircraft modified in accordance with FAA Aircraft Specification No. 5A3 have a bungee interconnect incorporated into the aileron and rudder control systems designed to retard control movements which might cause a pilot inexperienced in the T-34 to inadvertently achieve inverted flight or other unusual attitudes. In an otherwise normal control system, the bungee installation will give a completely different feel to the stick as you suggest.

Naval aviators who also fly Aero Club aircraft should be aware of these different handling characteristics and take them into consideration when piloting the T-34. ◄

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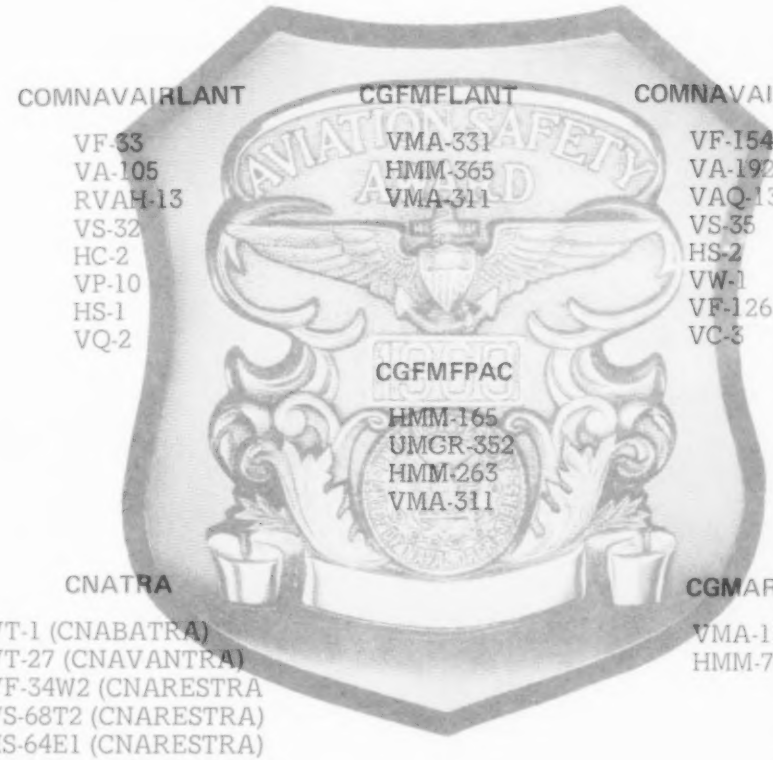
Credits **Cover Painting** by Blake Rader shows the one of the newer ideas in utility transports – the T-39 from North American. **Pg 47** Photo by W. T. Forsmark.

AWARD WINNERS



COMNAVAIRLANT

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VS-68T2 (CNARESTRA)
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